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Editor—HENRY E. SIGERIST

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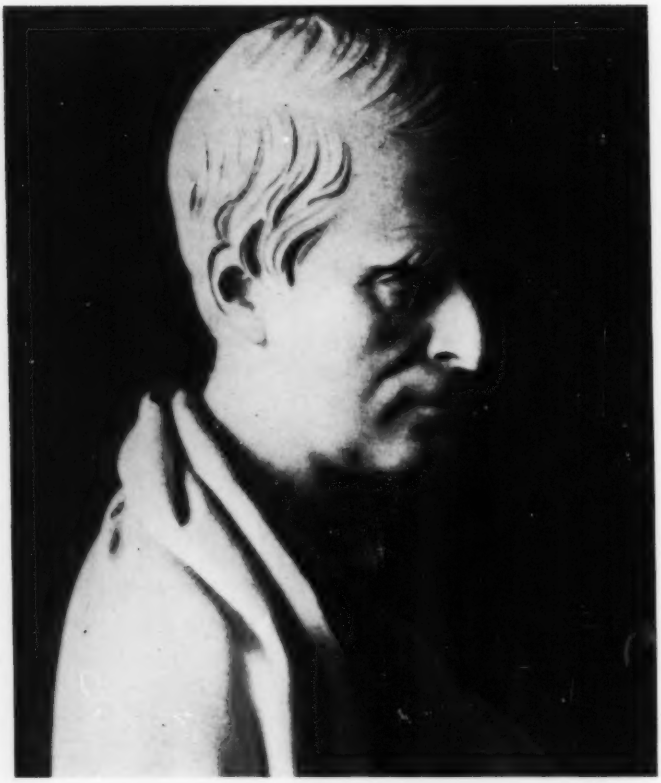

FRANCIS ADAMS OF BANCHORY (1796-1861)

This bust of Adams is by the sculptor William Brodie (1815-1881) who was well known for his efficiency in work of this kind. It is in Aberdeen University Library and was presented to the University by Dr. A. Leith Adams F. R. S., son of Francis Adams.

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VOLUME XII JUNE, 1942 NUMBER 1

A GREAT COUNTRY DOCTOR

FRANCIS ADAMS OF BANCHORY (1796-1861)

CHARLES SINGER

Every man of English speech who has any interest in the development of the Art of Medicine must be familiar with at least one book by Francis Adams. His translation of *The Genuine Works of Hippocrates* is probably the most widely read of any work on Medical History in our language.

English learning, that did so much for Greek scholarship during the nineteenth century, paid little attention to the Greek physicians. The name of Francis Adams stands almost alone amongst the medical scholars of the period. Nearer to our own day and in the twentieth century there has been revival of interest in Greek medicine in the English speaking world. In the last century, however, the figure of Francis Adams stands towering and almost isolated as a medical Grecian, while among Greek scholars as a class, irrespective of special departments, he takes a very high place. He has now been dead for over 80 years and we can survey his work in due perspective.

Francis Adams, or *Adam* as he always wrote his name in earlier years, was born in 1796 in the Parish of Lumphanan on Deeside. It is quite possible that his father had no proper surname in our

modern sense, that the great scholar was christened Francis son of Adam, and that he added the S later as indicating this relationship. The remote village of Lumphanan is some 27 miles by road from the city of Aberdeen. His father, who was probably illiterate, was a labourer or gardener employed at Auchinhove near-by, and his elder brother was still a small holder there as late as 1861. The district has, or had, some little notoriety as containing the supposed grave of Macbeth. An earthwork used to be shown where that chieftain was alleged to have made his last stand against Siward and Malcolm.

Adams received the first rudiments of education at the Parish School at Lumphanan. He is said to have later attended the Aberdeen Grammar School, though a search of its registers has failed to produce evidence of this. It seems probable, however, that though almost entirely self-taught and self-trained, Adams did somehow acquire the first elements of the classical languages while still at school.

Adams entered King's College, Aberdeen, in 1809 with a bursary, but there are no records of the positions taken by students in the classes at that date. He became M. A. in 1813 at the age of seventeen. There were then no honours grades at Aberdeen. It is a dark and bad period in the history of the University—or rather of the universities, for there were actually two in the town at that date. It is certain that Adams could have had very little help in any Greek studies there.

In after years he wrote of himself: "As far as I can think, my classical bent was owing to a friendship which I formed, when about fifteen years old, with a young man a few years older than myself, who had enjoyed the benefits of an excellent education at Montrose, which gave him a superiority over myself that roused me to emulation. In early youth I had been shamefully mistaught. I began by devoting seventeen hours a day to the study of Virgil and Horace and, it will be readily believed, such intense application soon made up for my early deficiencies. I read each of these six or seven times in succession. Having mastered the difficulties of Latin literature, I naturally turned my attention to Greek, as being the prototype of the other. It was the late Dr. Kerr of Aberdeen who drew my attention to the Greek literature of medicine, and at his death I purchased

a pretty fair collection of the Greek medical authors which he had made. However, I have read almost every Greek work which has come down to us from antiquity, with the exception of the ecclesiastical writers,—all the poets, historians, philosophers, orators, writers on science, novelists, and so forth. My ambition was always to combine extensive knowledge of my profession with extensive erudition." We shall consider the degree to which his aim was achieved.

After taking his M. A. degree Adams left Aberdeen for a while. It is very probable that he spent the next two years partly as an extra-mural student at Edinburgh and partly, as was the custom in those days, as assistant or apprentice to a surgeon-practitioner. It seems to me likely that at this period he came to know George Dunbar (1774-1851) who held the chair of Greek at Edinburgh from 1807 onward. Dunbar had a personal history similar to that of Adams though as a scholar he was never much more than second rate. No real evidence on these years is, however, available. In any event Adams was not a distinguished student nor did he, at this period, make any significant contacts. His medical and scientific, like his linguistic training was certainly very slender. For all these, as for most things in life, Adams had to rely upon his own great powers. There can be no doubt, however, that he spent his time well for, in the late fall of 1815, he went to London where a few weeks later he passed his examination as a Member of the Royal College of Surgeons being then just over nineteen years old. His certificate is signed by Henry Cline (1750-1827) who had just been elected into the Mastership, and who was remembered in my student days for his forearm splint. In his own day Cline was better and less favourably known for his support of the French Revolution!

Returning to Scotland Adams soon settled at the village of Banchory-Ternan on Deeside. In the cares and duties of his practice there the rest of his useful, full and happy life was passed. He took a small house, the Old Manse, from which he never moved though, as his practice grew, he enlarged and altered it a good deal. In the turret window of that Old Manse, George Campbell (1719-96), later Principal of Marischal College, Aberdeen, and Professor of Divinity there, had written his translation of the four Gospels from the original Greek. In the same window Adams, 60

years later, wrote his translation of Hippocrates. The Old Manse was pulled down in 1893—just 50 years ago—and a new house, where his son-in-law, the late Dr. Thomas MacHardy lived till well into the twentieth century, was erected in its place. Many years ago I made a pilgrimage to Banchory, and was able to talk with Adams' son-in-law, then in extreme old age.

Soon after settling in Banchory, Adams married the only daughter of William Shaw, a small local landowner. By her he had three sons and three daughters. His wife, however, died young and the care and education of the children was added to the other preoccupations of Francis Adams. He was a devoted father and, despite his busy life, he managed often to ramble with his children along Deeside and to botanise with them. His love of nature was passed on to at least one of his sons, A. Leith Adams (died 1882), an army surgeon, later a Fellow of the Royal Society and Professor of Natural History at University College, Cork. Leith Adams has a permanent place in the history of biology by reason of his discovery of the dwarf fossil elephants of Malta. The scientific tastes and distinction of the son were a source of lasting gratification to the father.

The first publication of Francis Adams was a little volume put together in 1820, *Hero and Leander, translated from the Greek of the poet Musaeus.* This work, if remarkable in reference to the absence of training of its author, cannot be called a very successful effort. Adams, despite the studied purity of his language, was never master of a flowing English style. At his best he always seemed more at home in the classical tongues than in his own, nor was verse the happiest medium for his very masculine and positive mode of thought.

The special powers of Adams were not of a type that matures early or rapidly. In 1825, when he was thirty, he had still not emerged from his apprentice stage as a scholar. In that year there was proposed as a theme for the Blackwell Prize at Marischal College, Aberdeen, *The Differences between Greek and Latin Syntax.* Three essays were submitted. One was by Edward Woodford (M. A. 1824, LL. D. 1842) afterwards one of Her Majesty's Inspectors of Schools, the second was by Adams and a third by an unknown competitor. The judges unanimously and quite justly made the

award to Woodford, who was junior to Adams. Both essays still exist in manuscript, or did some twenty years ago when I examined them. That by Adams shows very wide and close reading of classical authorities but is not particularly interesting or original. The Greek in it is written without accents. This would shock a modern scholar but the custom was not at all unusual at that date. Thus, for example, the eminent contemporary of Adams, Lord Robert Curzon (1810-1873), whose knowledge of Greek was very remarkable and who was in the full Oxford tradition, adopted the same method. The essay of Adams betrays no special knowledge of the Greek medical writers. He printed it in 1826 under the title of *Hermes Philologus.*

Hermes Philologus, though unsuccessful in the contest, brought Adams into contact with the learned world. It attracted the notice of Edmund Henry Barker (1788-1839), a very able but also a very eccentric scholar afterwards editor of that extremely popular work known as *Lemprière's Classical Dictionary.* This was still in common use in my own school days when I often referred to it. To one of the editions of Lemprière Adams contributed a most valuable article on the Arabian physicians which may still be read with profit. It brought him into correspondence with Charles Anthon (1797-1867) of what was then Columbia College, New York, who was one of the principal classical book-makers of his day. I can remember using his works too in my boyhood.

It was about 1826 or 1827 that the direction of the studies of Francis Adams was finally determined. This was caused, as he has himself explained, by his acquisition of the library of the deceased Dr. George Kerr of Aberdeen. This able and eccentric man had, as long ago as 1789, aided in founding the Aberdeen Medical Society which had hitherto given Adams his main contact with the outer world. Kerr was a whimsical practitioner, who had amused the profession and irritated the less humourous among them by an attack upon the reputation of William Harvey. He had good literary taste and had put together a respectable library of the Greek medical writers. The first results of the study of these by Adams was a paper *On the Nervous System of Galen and other Ancient Authors,* which appeared in 1829. It was a sortie, somewhat in the manner of Kerr's

escapade though with more justification. In it the priority of the teaching of Charles Bell is investigated with learning and acumen. Adams, now thirty-three, had at last graduated as a medical scholar.

While this paper was preparing, Adams had a very much larger and more important task in hand, namely his great edition of *Paulus Aegineta*. "I began the translation of Aegineta," he wrote in later years, "in the end of November 1827, and finished it on the 28th April 1829. I never, at any period of my life, underwent so much literary drudgery. During these months I sat up late and rose early and snatched every minute I could from the duties of my profession. At that time my practice, though not lucrative, was extensive, especially in the obstetric line. I arranged, however, to work at my translation ten hours a day!"

The work was worthy of the effort. The masterpiece, *The Seven Books of Paulus Aegineta by Francis Adams*, retains to this day its position as far and away the finest venture in pure historical medical research in the English language. It is more than a translation, more than a commentary. The extensive and accurate notes that accompany it trace the practice of Paul backward into remoter antiquity and forward into mediaeval times. These make it, in fact, a reference book to the whole history both of Greek and Arabian medicine. It is the best and most useful work of its kind in the English language and one of the best in any language. The task he set himself will probably never be attempted again. It has never been a "best seller" but I am of opinion that the day will come when this book will be regarded as an especial adornment of an historical medical library. Learned books have a surprisingly short life. I know hardly a dozen prepared as long as a century ago which are still in current use by scholars. The *Paulus Aegineta* of Adams is one of them.

A start in the publication of *Paulus Aegineta* was made in 1834. Owing to the failure of his printer, only one volume appeared. Ten years later the matter was taken up by the Sydenham Society which produced the work complete in three volumes between 1844 and 1847. Its final state represents 20 years solid work by a sound, sane and sagacious scholar. In the original edition Adams had made some attempts to trace Greek practice beyond the Arabians into

more modern times. For the later period, however, his knowledge was still incomplete and this part of the work is rather uneven. At the suggestion of the committee of the Sydenham Society the later material was omitted. I have collated passages in the two editions and am satisfied that the decision was wise. The reputation of Adams has lost nothing by it. The omitted material is only occasionally of value, and against this we have to set off the corrections, additions, index and completeness of the edition issued by the Sydenham Society. Thus, save as a bibliographical curiosity, the first edition is entirely replaced by the second. The book brought Adams recognition by the University of Glasgow, of which he became an honorary Doctor of Laws in 1846. Few honorary degrees have been better earned.

After the publication of the *Paulus* the position of Adams in the republic of letters was naturally assured. In an able article in the *Foreign Quarterly Review* of 1839, in the course of a comparison of British and German scholarship, though the former are disparaged full justice is done to the effort of Adams. Thus when the Sydenham Society decided to produce an English version of Hippocrates, Adams was the natural man to approach for the task. " I finished the translation of Hippocrates," he wrote, " in about four months. The certainty of obtaining a fair remuneration for the trouble it cost me, and that it would not be a light hidden under a bushel, made this by far the most delightful task I ever engaged in. The reception of it was everything I could desire. It cost me some professional sacrifices, but this was amply made up by the delight and mental improvement it conferred on me."

The work of translating and editing Hippocrates was very necessary. Adams here conferred a permanent benefit on the English-speaking medical profession. Yet the task was, in fact, incomparably less arduous than that which he had already achieved, nor was this work of quite the same quality, nor should it be accorded the same power of endurance as the *Paulus Aegineta*. Paul had not been seriously edited since 1548 and the text was in a bad state. In the case of Hippocrates Adams had the first five or six volumes of Littré to work upon. He was also able to avail himself of the labours of Foes, van der Linden, Koraes, Kühn and Dietz, who had

all passed along a somewhat similar track. Moreover the weak point of Adams was always his rather rigid English style. His exact and scholarly periods are not invariably fortunate in interpreting the calm, stately, simple thought of the greatest documents in the Hippocratic Collection. Furthermore the whole face of the Hippocratic problem has altered since his day and the criteria of "genuineness" that he used have lost much of their meaning in the light of more recent research. His work here is not final in the sense in which that word may be used of his Paul of Aegina. There is, in fact, still great need for a complete English edition of Hippocrates towards which only a beginning has been made by Mr. W. H. S. Jones and Dr. E. T. Withington. It is, however, unlikely that anyone who reads these lines will live to see a translation and commentary of Paul of Aegina treated again in the complete and highly competent manner of Adams.

The edition of Hippocrates appeared in 1849. It was followed by *Aretaeus the Cappadocian* in 1853. This represents the only considerable effort by Adams to edit a text and to work on manuscript material. His reputation as a Greek scholar was now entirely established and he was afforded every facility for his research. He had, moreover, the aid of Professor Geddes of Aberdeen University (afterwards Principal Sir William Duguid Geddes, 1828-1900), himself a fine Greek scholar, who had recently left Adams' old school, the Aberdeen Grammar School, to take up the professorship of Greek at the University. That Chair, it is interesting to know, Adams himself had refused on the plea of attachment to his profession and his patients. If there be others still living who have conversed, as I have, with patients of Adams, they will applaud his decision. The University of Aberdeen honoured itself when it made Francis Adams M. D. *honoris causa* in recognition of the value of his Aretaeus.

In 1853 Adams published a small collection of poems under the title *Arundines Devae*. It contains a series of translations of Horatian odes into English verse, a translation of Grey's Elegy into Latin verse, and of Charles Wolfe's famous lines on the death of Sir John Moore into Greek verse. I have submitted this volume to an eminent scholar, specially distinguished as a critic of Greek and Latin poetry. He expresses a very high opinion of the merit of the work, but

observes that the translations from English are, as we might expect, very much superior to those into English. I venture to concur.

In 1858 Adams printed a volume *On the Construction of the Placenta*. The book was entitled by him "An Historical Sketch," but it contains, in fact, a great deal of careful first-hand information, together with a remarkable array of learning extending beyond the Arabian writers into his own day. He had now conquered the more modern history of medicine. The book on the placenta is based on a long series of articles published by him in the *Medical Times and Gazette*. It contains an attack on the views of the Hunters and of more recent anatomists. His conclusion " that the human placenta is altogether a foetal structure having no vascular connection with the mother " could not, of course, now be accepted. Nevertheless there can be no doubt that Adam had collected a valuable series of observations on obstetric matters. He was, in fact, a scientific and highly experienced obstetric surgeon.

During these years Adams made several journeys south, visiting Oxford and London, where he was received with respect, and made the friendship of many learned men, among them Jones Quain (1796-1865) and William Sharpey (1802-80) in whose houses he stayed as guest. These two men, both professors at University College, London, are historically interesting as the founders of the modern academic teaching of Anatomy and Physiology in England. Their methods provided the staple of anatomical teaching well into my own student days. I may claim that I received my own medical training in the Quain and Sharpey tradition.

In 1859 the British Association met at Aberdeen. On that occasion Francis Adams, in conjunction with his distinguished son Dr. Leith Adams, then home on leave from the army, read an able paper, bearing the singularly clumsy title *On Ornithology as a branch of a Liberal Education, containing notes of all the Wild Birds which have been discovered in Banchory-Ternan with remarks on such of them as have been found in India*. It was published as a pamphlet and betrays very patient and careful observation. It is most readable and shows that the old doctor must have kept systematic notes of bird life over a long series of years. In the same year he printed a little discourse *On the Writings of Burns*, which he had delivered at Banchory on the Burns Centenary.

Banchory is some 17 miles by road from Aberdeen but for many years Adams used to ride in regularly to attend the meetings of the Medical Society there. He resigned the Presidency of the Society in 1860. In the following winter, after a visit to a distant patient on a wild night, he developed pneumonia and died in his 65th year after a few hours of illness and in the plenitude of his powers. "The old doctor never did know how to take care of *himself*" said to me once one of his ancient patients.

In person Adams was a tall, muscular, somewhat ungainly figure with a strong, shrewd, kindly countenance. He loved outdoor exercise and especially riding, but half a life-time in the saddle left him one of the most gawky of horsemen. Fortunately his horses seem to have developed the same affection and respect for him as had the human inhabitants of Deeside. One old favourite always knew when his master had passed into a reverie and would stop to await patiently his awakening. It was once said to me that the name of Dobbin should, in common fairness, appear on the title page of *The Genuine Works of Hippocrates* below that of Francis Adams! He had a habit of jerking in the saddle as he rode. When he passed into one of his day-dreams Dobbin knew it well and would promptly halt, but the jerks of Adams would continue. This, I have been assured and I well believe, gave huge delight to the idle boys of Deeside, who would risk being late to school and consequent caning for the pleasure of watching the old doctor at his antics!

Adams had a very peculiar mode of working, to which I know no parallel. He slept little—only about five or six hours at most. When he returned home from his rounds in the late afternoon he would have his supper, collect such books as were specially interesting him and retire with them at once to bed. He fell asleep immediately and slept for about two hours. He would then awake and work right through the night, falling asleep again for about three or four hours before rising in the morning, not beginning to see patients till about ten.

Adams always carried a Latin or Greek book in his pocket so that he might fill any spare or waiting moment with his beloved study. One of his favourites, which lies on my table as I write, was a tiny duodecimo edition of Boethius, his *Consolations of Philosophy,*

printed at the Leyden house of Plantin in 1590. In it the old scholar has written "Aureus libellus! Quem legi, relegi, iterumque legi per XL fere annos, et lecturus sum saepe si vivam, F. A. MDCCCLII." "A book of gold. I have read it, re-read it, and read it yet again for nigh on 40 years and, if I live, oft will I read it yet. Francis Adams 1852." He had been reading this golden book since he was fifteen, and had specially marked the lines

> Gloria felicis olim viridisque juventae
> Solatur maesti nunc mea fata senis.
>
> "The Art that was my young life's joy and glory
> Becomes my solace now I'm old and sorry."

He was never away from the books he loved. One who knew him described how he paid a surprise visit to Banchory and "found him at breakfast, ready for his ride up the Feugh and amusing himself with pencilling down a translation of an ode of Horace into Greek verse." We think of Adams as a scholar, but the same friend reminds us that he must not be remembered as a mere man of books. "His was a robust, hardy, eager nature, hungering after knowledge of every sort, and in the structure of his mind and its bent more like the Scaligers and Bentleys of old than the mighty but mere wordmongers among the moderns. He was made of the same tough and fiery material as were George Buchanan and Florence Wilson, Andrew Melville and the huge turbulent and intrepid Dempster,—men who were scholars and a great deal more,—shrewd and full of public spirit—men of affairs as well as of letters. It is this intermittent shrewdness and fervour with hardheadedness and patient endurance of mental toil, so peculiarly Scotch in its quality as in its flavour, which makes a man like the country-surgeon of Banchory-Ternan worthy of more than a passing notice."

He was an old and thorough Liberal of a time when it was not always to a man's worldly advantage to be called by that name. In the ardour and enthusiasm of his youth he had been a supporter of the French Revolution. Some would, I suppose, say he was a "radical" but the use of that word in Britain is very different from what it is in the United States. Yet he surely was an outspoken lover of freedom in thought and speech and act, and had an inborn hatred for whatsoever was low and tyrannical and narrow and mean. By the

sheer force of his intellect this country doctor, son of an ignorant labourer, made his own place in the republic of letters. He walked among his few peers but he did not forget the rock from which he was hewn and the hole of the pit whence he was digged. He became the cherished friend of such men as Sir John Forbes (1787-1861), introducer of the stethoscope and percussion into England, Dean Milman of St. Paul's the scholarly author of the *History of the Jews* and the *History of Latin Christianity* (1791-1868), John Hill Burton (1809-1881) the historian of Scotland, W. A. Greenhill (1814-94) of Oxford, the only contemporary English medical historian with whom he could discuss his own subject on anything like equal terms, Sir William Hamilton (1795-1856) the metaphysician, John Brown of *Rab and his friends* (1810-1882), Sir James Clark (1780-1870) the authority on climate, Sir William Jardine (1800-1874), the naturalist, and he was the correspondent of many of the best continental scholars. But he was first and foremost the adviser and comforter of the sick and the forlorn. To forget the country family doctor Francis Adams, in the scholar, is to mistake the man. But the secret of his friendships is by no means hard to find. He was a man of sane and well-stored mind so that his speech was as apples of gold in baskets of silver. He was very quick of apprehension and of reply. I have spoken with several of those who had spoken with him and the charm of his conversation and of his character was remembered when he had been in his grave for nigh on sixty years.

This great-hearted man was always generous in his praise of others and by no means unpleasantly fond of their praise of him. He was a lover of his species, a gregarious creature despite his solitary midnight toils, and he enjoyed as much as he adorned any society where intellectual conversation was rated high. Yet his first love and his last was his practice, his patients, and the poor. One has written of him that " in any other country such a man would not have been permitted to remain long in such a position. It is a noticeable fact, and something to be both proud and ashamed of, that the most learned physician in Britain and probably in Europe is at this moment a country surgeon in a small village on Deeside." But he never looked at the matter at all in this light. He never regretted,

for he never felt, any lack of scope. He was a strong advocate of the establishment of chairs in the history of medicine, but he would most certainly have refused such a post for himself as he did the professorship of Greek that was offered him. We must not regret for him what he did not regret for himself. His familiarity with sickness and suffering and death undoubtedly enabled him to annotate Paul and Hippocrates with a force and a point that could not otherwise have been his and, perhaps, has not been given to any other medical historian. But more; his fine manly independence has given a peculiar and unforgettable aroma not only to his memory but also, and perhaps even more, to his scholarship. Had he become a professor, his reputation as a scholar would not have risen much higher. He might, perhaps, have written a few more learned works but he would have robbed the annals of our craft of a memory that will smell fragrant wherever learning and manliness and mercy and the discharging of the plain human duties, even to a man's own hurt, are things that are held in high repute. The annals of our profession present no finer example of *dignity*, in the first sense of that great word, than is provided by the career of Francis Adams of Banchory.

In several respects the achievements of Adams were unique. The ranks of general practice in Britain have produced many men eminent in science. Such were, for example, J. A. Lockhart Clark, Sir James Mackenzie and J. A. MacMunn. But none of equal distinction as a scholar, so far as my knowledge serves me, practiced in so isolated a locality as Adams. The only one to whom I can compare him was my near neighbour, the naturalist Jonathan Couch (1789-1870) of Polperro, the discoverer of amphioxus, of whom one day I may perhaps write something. Couch and Adams were close contemporaries and the two men's career and characters present some close and interesting parallels. There were giants in those days! But Couch, who hardly ever left his native fishing village, was before all else, an observer of marine creatures that could hardly be obtained save in such localities. Adams excelled most in a type of learning which is not commonly carried on far from the haunts of men of like tastes.

Outside medical ranks I know of several untrained British scholars who achieved important results. Among them, for example, were Thomas Taylor (1758-1835) the Platonist and the late Stephen Mackenna, translator of Plotinus. But I know of no scholar of this type who was so complete a man as Adams, who became highly efficient in his profession and in his manhood apart from his scholarship. Of all departments of research it might be thought that literary and historical work depend most on close proximity to the great centres of population, with their libraries and universities and special facilities for research. Yet this isolated and busy practitioner stands out as the most learned of all our learned medical historians. More than any other department of knowledge the classics are commonly held to demand for their appreciation the discipline of early training. Yet this country doctor, self-taught and self-trained, takes his natural place among the greatest Greek scholars that Britain has produced. In other lands Greek medicine has had commentators and editors not less learned than our Adams. Such were Koraes, Daremberg, Petrequin, Littré, Kühn, Diels, Sprengel, Ermerins and Valentin Rose. But none of these men has exhibited the same familiarity with the whole round of clinical facts as Adams and none compares to him in width and depth of clinical experience. It is this familiarity with the facts of disease that gives to the work of our Adams its special value. And, as a corollary to this, none of the great historians of medicine save Adams—and to a less degree Petrequin and Sprengel—has contributed effectively to current medical literature; none, in fact, was, in so full a sense, practicing physic and surgery as Adams. None, perhaps, was so complete a man. And none, perhaps, practiced medicine under conditions so like to those of Hippocratic times.

Before I leave my old friend—for such he is to me though he died 15 years before I was born—I must add something of him as a practitioner. " He spent his days in the arduousness and beneficent profession of a country surgeon, out in all weathers and at all hours, having the lives, the births, the deaths of a wild outlying region in his hands. This work he did so thoroughly that none could, with a shadow of justice, say that his learning lessened his readiness and

his ability for the active duties of his profession in the fullest rounds of its requirements. He was an attentive, resolute, wise practitioner, just such a man as we would like to fall into the hands of, were we needing such aid. He was always up to the newest knowledge of the time, but never a slave to any system or addicted to swear by any master. The whole cast of his mind was thoroughly free and self-sustained." If he had any idols, they were among the mighty dead; but even they were his companions rather than his guides. He was never fantastic or eccentric or a mere antiquarian. Papers such as he wrote *On the Treatment of Malignant Ulcers of the Face, On the Treatment of Burns* and the series *On Uterine Haemorrhage* show him as the alert practitioner that he was; observant and scientific eager to advance his art and anxious that all should profit by his own wealth and variety of experience. His remarkable *Case of dislocation of the knee-joint with Dissection* has still, I believe, a place in surgical literature. Oddly enough, it also illumines a very difficult passage in the Hippocratic text.

On the grave of this great country doctor there stands a monument whereon his friend, Principal Geddes, caused these true words to be engraved:

IN MEMORIAM
FRANCISCI ADAMS, M. D., LL. D.
MEDICORUM
OMNIUM QUOTQUOT SCOTIA TULIT
LITERARUM THESAURIS
NECNON SCIENTIARUM OPIBUS
AB AULA ET ACADEMIA PROCUL.
MEDICINAE SIMUL ET MUSIS
VIR VERE APOLLINARIS
FIDELITER INSERIIT.

"In Memory of Francis Adams, M. D., LL. D., of all physicians whom Scotland has produced most familiar with the treasures of literature and with the resources of science, long in this retired vale, far from Court and University, a true votary of Apollo, he devoted himself faithfully to Medicine and the Muses."

I have said that I never met or could have met my friend. But often have I felt that he and I have walked and talked together. I have tried to gather something from his rich learning and his yet richer wisdom and humanity. I know that he and I are very different sorts of men who have had very different sorts of lives and have worked in very different ways. Yet I like to feel that he had some regard and respect for me since I feel that for him which I cannot put into words.

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2. *Classical Journal.* Various papers chiefly on Greek prosody.
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4. *London Medical Gazette*, 1842, I, 409, "Case of dislocation of the knee-joint with dissection"; 1854 N. S. I, 755-767, "On the nature and treatment of flooding after delivery"; 1846 N. S. II, 139-150, "Further statement of facts and observations in illustration of the nature and treatment of flooding after delivery"; 1847 N. S. V, 155, 194, 287, 378, 421 and 1849 N. S. VIII, 150, "On the Construction of the Placenta and the mode of communication between the mother and the foetus in utero."
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TWO FAMILIES OF ATHENIAN PHYSICIANS

STERLING DOW
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ὡς ἡδὺ πᾶν τὸ μέτριον· οὔθ' ὑπεργέμων
ἀπέρχομαι νῦν οὔτε κενός, ἀλλ' ἡδέως
ἔχων ἐμαυτοῦ. Μνησίθεος γάρ φησι δεῖν
φεύγειν ἁπάντων τὰς ὑπερβολὰς ἀεί.

"How sweet is everything that is moderate; today I come away neither overstuffed nor empty, but pleasantly comfortable. For Mnesitheos says that one should always avoid excesses in everything."

—Alexis, *Foster Brothers*, quoted in Athenaeus, X, 419bc (translation by C. B. Gulick, Loeb edition).

The Oath which bears the name of Hippokrates contains the following clause: "To impart precept, oral instruction, and all the other learning, to my sons." [1] Information telling us precisely to what extent physicians in classical times actually obeyed this promise or (if the Oath were not yet formulated) [2] followed this practice, has not come down to us. Nor have we statistics on what proportion of the sons thus taught did actually devote themselves to a medical career. Yet such facts were important in their day, important for society as a whole and for the profession in particular; else the clause would never have found a place in the Oath.[3]

[1] Translation by W. H. S. Jones in his pleasing volume, *The Doctor's Oath* (Cambridge, Eng., 1924), p. 9 with commentary. The meaning is probably "instruction, written, oral, and practical" (Jones, *Hippocrates*, Loeb edition, vol. I, p. 299, n. 2).

[2] The date when the Oath was composed cannot be exactly determined. K. Deichgräber, in a full study devoted mainly to the ethics of the Oath, puts it in the time of Hippokrates himself (*Quellen und Studien zur Geschichte der Naturwissenschaften und der Medizin*, Band 3, Heft 2 [1932], pp. 29-49). W. H. S. Jones, *Oath*, pp. 39-41, thinks that the nucleus, at least, goes back to Hippokrates; there are hints that parts were in verse originally, that the language is "liturgical," and hence that such parts go back still earlier (*op. cit.*, p. 43, n. 1). W. Jaeger tells me that in his opinion the Oath as a whole can hardly be later than the middle of the fourth century B. C. Cf. Jaeger's *Paideia*, vol. II (forthcoming).

[3] The part of the Oath from which the above quotation comes has been taken to mean that a sort of guild of doctors (i. e. Asklepiadai) were the persons for whom the Oath was composed (Jones, *Hippocrates*, vol. I, p. 293; *Oath*, p. 43). This possibility does not affect the present study.

What we do have are data on certain individuals and families. It is not my intention here to collect and to interpret all of these data, but rather to deal with just two families. The extant records more than once associate these two families with each other in the persons of their most distinguished members, the physicians Dieuches and Mnesitheos. The greatest medical authority in their period was Diokles of Karystos, "the second Hippokrates." W. Jaeger has recently put Diokles in his proper setting by proving that his career began before 300 B. C. and extended into the 260's; has restored to Diokles writings and views and relationships which had been denied to him when (as generally theretofore) he was dated a century earlier; and has determined the relationships of several of the younger contemporaries and the followers of Diokles.[4] The way has thus been opened for fuller knowledge of this whole group, which included many of the greatest medical authorities of antiquity. The details which concern us here involve first of all an inscription which has proved troublesome in the dating of Dieuches and Mnesitheos. On this question the Oath has a bearing which has been neglected.

In or near the sanctuary of Asklepios in Athens there was discovered many years ago an elaborate dedication consisting of a relief with inscriptions above and below.[5] The relief shows Asklepios, Demeter, and Persephone being worshipped by six men. Below the relief are five crowns of olive—not six, presumably because no honorary crown had been voted by the Athenians to the sixth man. Within each of the five crowns is inscribed a man's name, followed in the normal fashion by the name of his father in the genitive, thus:

[Θε]οδωρίδης	Σώστρατος	Ἐπεύχη[ς]	Διάκριτος	Μ[ν]η[σ]ί[θεος]
Πολυκράτος	Ἐπικράτος	Διεύχο[ς]	Διεύχος	[Μν]ησιθέο

[4] W. Jaeger, *Diokles von Karystos: Die Griechische Medizin und die Schule des Aristoteles* (Berlin, 1938). With the book should be read an article written subsequently, "Vergessene Fragmente des Peripatetikers Diokles von Karystos," *Abhandlungen der Preussischen Akademie der Wissenschaften*, 1938, Phil.-hist. Klasse, no. 3, pp. 1-46. A convenient introduction and summary of both book and article is another article, "Diokles of Carystus, a New Pupil of Aristotle," *The Philosophical Review*, 49 (1940), pp. 393-414.

[5] Most recently published by J. Kirchner in *Inscriptiones Graecae*, II² (1935), no. 4359; earlier, with a photograph, by Paul Girard, *L'Asclépieion*, pl. 2; I. N. Svoronos, *Das Athenische Nationalmuseum*, pl. 36, 2; and P. Arndt—W. Amelung, *Photographische Einzelaufnahmen*, Serie V, pp. 14-16, no. 1236.

The names in the first two crowns are otherwise unknown. In the third and fourth crowns are the names of two sons of a certain Dieuches, and in the fifth crown is a son of a certain Mnesitheos.[6]

The place of finding; the known connection of physicians with the Epidauria, a festival of Asklepios, and with the Asklepieia; and the occurrence of the names of the two distinguished physicians, all contributed to make it certain that the whole group of six dedicants were physicians. It could be assumed also with tolerable certainty that the six dedicators were all mature men, since the relief certainly does not show them as youths; since five of them had been voted crowns; and since they were able to pay for a dedication. Accordingly their fathers were presumably either elderly or no longer alive. The dedicators in fact may already have had sons who were in the 'teens or twenties.

Prior to Jaeger's studies, it was assumed that the two fathers Dieuches and Mnesitheos named in the inscription were identical with the famous physicians Dieuches and Mnesitheos known from medical literature.[7] The inscription was dated "before the middle of the fourth century B. C." This would place Dieuches and Mnesitheos at least as early as *ca.* 380 B. C. If that date seemed 50 years or so too early, then the attempt to find a date might be abandoned as at present hopeless;[8] another obvious course was to doubt whether the inscribed relief were correctly dated.[9]

The latter doubt may be quickly resolved. The style of the sculpture and the posing of the figures make the relief contemporary with Athenian grave monuments of the generation before Demetrios ended that type of monument in 316 B. C.[10] The lettering too seems to be

[6] That the son's name was Mnesitheos is proved by the inscription above, where it occurs fully preserved.

[7] Without special study, even Kirchner (commentary on *I. G.*, II², 4359) could accept the then current view, as he had earlier in his *Prosopographia Attica*, nos. 3765, 10282, etc.

[8] In the Liddell-Scott-Jones *Greek Lexicon* of 1940, no date is assigned to Dieuches (p. xxii).

[9] This was done, though without any study of the relief, by H. Hohenstein in his useful collection of no fewer than 48 fragments of Mnesitheos (*Der Arzt Mnesitheos aus Athen* [diss. Berlin, 1933; published at Jena, 1935], pp. 8-12).

[10] Cf. H. Diepolder, *Att. Grabreliefs*, pl. 51, 2. Diepolder makes out three periods or phases. The present monument belongs to the last of them.

of the period *ca.* 360-320. Within these limits, the genitives in *-os* and *-o* (of which there are five) strongly favor the earlier terminus.[11] The monument may therefore be dated *ca.* 360 – *ca.* 340 B. C.; we might modify the date given in the Corpus from *ante med. s. III* to *med. s. III*; we cannot change it to *fin. s. III*.

Even without this better-established dating, Jaeger hit upon an attractive new solution. He conceived that the physicians Dieuches and Mnesitheos, famous in literature, were not the fathers of the dedicators but rather descendants of the dedicators—in Jaeger's view, their sons.[12] To confirm this hypothesis we may now adduce the Oath of Hippokrates: the dedicators did as they had sworn to do (or as custom dictated) and trained their sons to be doctors. The Oath is not the only general evidence as to the transmission of the art in families.[13] Galen (Kühn, II, 280-281) states explicitly that in olden times physicians taught their sons;[14] and Plato, in his *Laws* (IV, 720 B), with the actual conditions of his own day in mind, speaks of "the way in which the freeborn doctors . . . instruct their own sons."[15] The oath, the inscription, and the references in literature support each other. The transmission of the medical art from fathers to sons seems in these instances to be assured. As was common in Greece, the sons would bear names which were repeated in every generation, or in every other generation, of the family. Very likely the fathers of the dedicators also were doctors. In fact it may well be that the inscription gives us the names not of five doctors but of ten, and that this very group had a large share in carrying on the profession during much of the century (otherwise

[11] K. Meisterhans—E. Schwyzer, *Grammatik der attischen Inschriften*, ed. 3, pp. 6 and 26: the false diphthong earlier written as ο is written ου regularly though not invariably, beginning at *ca.* 360 B. C.

[12] *Diokles*, p. 226, n. 2; with a sentence which points out the interest of this matter for "social" history: "Wenn die Archaeologen nicht irren . . . lässt das Relief uns in die Familiengeschichte attischer Asklepiadengeschlechter einen erwünschten Einblick tun."

[13] Deichgräber, *op. cit.*, pp. 32-33 (with notes) has the only general comments which I have seen on this.

[14] I owe this reference to Dr. F. B. Lund.

[15] The word here translated "sons" is παῖδας. R. G. Bury (Loeb edition) translates "disciples," a meaning not given in Liddell-Scott-Jones, *Lexicon*; and there is no warrant for assuming a figurative usage.

fairly barren now of names) between the great days of Hippokrates and the great days of Diokles.

It should be possible now to be more precise about the dates of the Dieuches and Mnesitheos known from literature and about their relationships to the persons named in the inscription. If the hypothesis that they were descendants of the men named in the inscription is correct, then the question arises, Can they have been not sons but grandsons of the doctors who dedicated the relief in *ca.* 350 B. C.?

Mnesitheos is the better known and was probably the more important of the two: it will be convenient to attempt to date him first. There can hardly be a doubt that much of the chronological information which reached Celsus and Galen was fairly accurate: the study of the history of medicine had been begun by Menon, a pupil of Aristotle.[16] It must of course be borne in mind that when in a list preserved, for example, in Galen, Doctor A follows Doctor B, Doctor B need not belong a whole generation (conventionally, 33 years) later than A. The period of Diokles was a period when many great careers overlapped. Hence B could be a younger contemporary of A.

Thus when a casual list of three authorities places Mnesitheos after Theophrastos, it is possible to surmise that Mnesitheos was active before the death of Theophrastos in one of the years 288-286.[17] A later date is suggested by Galen, who dates Mnesitheos after Diokles, once explicitly,[18] and four times in lists.[19] We have

[16] References to Menon and other ancient historians of medicine: Christ—Schmid—Stählin, *Geschichte der griechischen Litteratur*, I, 1 (Munchen 1929), pp. 761-762.

[17] Mnesitheos, frg. 6 Hohenstein = Galen, XI, 449. Jaeger, "Vergessene Fragmente," p. 44.

[18] Galen, XVII, B, 608 (= *Medicorum Graecorum Opera*, ed. C. G. Kühn, vol. XVII, part ii, p. 608) = Diokles, frg. 33 Wellmann (= M. Wellmann, *Die Fragmente der sikelischen Ärzte Akron, Philistion und des Diokles von Karystos*, p. 131, frg. 33).

[19] Galen, X, 28 and 462; XI, 163; XV, 135-136. A fifth list (Galen, X, 110 = Diokles, frg. 32) runs Athenaios, Mnesitheos, Diokles, Pleistonikos, Hippokrates, Philistion. This is a random citing of authorities, but the beginning is obviously in the exact reverse of the chronological order. It therefore does not constitute an exception.

already seen that Jaeger has established for Diokles a long career. Prominent soon before 300, he was still active in the 260's.[20] Mnesitheos must therefore have flourished at the earliest soon after 300. This conclusion, namely that he follows Diokles after a certain (as yet undetermined) interval of time, is fully substantiated by Jaeger's study of the fragments.[21] Hohenstein, with the fragments before him, could still argue, as we have seen, for a fourth century date. That this was wide of the mark is shown by the following list: **προέστησαν δὲ τῆς μὲν λογικῆς αἱρέσεως Ἱπποκράτης Κῷος . . . μετὰ δὲ τοῦτον Διοκλῆς ὁ Καρύστιος, Πραξαγόρας Κῷος, Ἡρόφιλος Χαλκηδόνιος, Ἐρασίστρατος Κεῖος** (Χῖος ed.), **Μνησίθεος Ἀθηναῖος, Ἀσκληπιάδης Βιθυνός** [Κιανός], **ὃς καὶ Προυσιεὺς** (Προυσίας ed.) **ἐκαλεῖτο.**[22] With its explicit and meticulous wording, and with ethnics carefully given (though not all carefully transmitted by copyists), this list inspires confidence. It is indeed *the* great list of the greatest Greek medical authorities. The first four names are given by Celsus in another explicitly chronological list: *Diocles Carystius, deinde Praxagoras et Chrysippus, tum Herophilus et Erasistratus.*[23] Here the order is the same and near contemporaries are grouped together.

The information for testing these lists has been assembled by Jaeger in "Vergessene Fragmente," pp. 36-40, which may be summarized as follows. *Praxagoras* was somewhat younger than Diokles and was influenced by him. *Chrysippus* (the younger of that name) was in favor at the court in Alexandria from 286 to *ca.* 279 or a little later. *Herophilos* was a pupil of Praxagoras who went to Egypt before 286 and flourished in the 270's and 260's. *Erasistratos*, a younger contemporary of Herophilos, studied in Athens under Metrodoros and Straton, and in Alexandria under Chrysippos; Eusebios puts his **ἀκμή** at 258/7, which appears to be correct. Thus far then there is no doubt that the list in Pseudo-Galen is accurate. The physician whom it names last, *Asklepiades*, flourished *ca.* 80 B. C. *Mnesitheos* remains. His **ἀκμή** should fall

[20] Jaeger, "Vergessene Fragmente," p. 17.
[21] "Vergessene Fragmente," pp. 40-46.
[22] Diokles, frg. 3 = Pseudo-Galen, intro. ch. 4 (XIV, 683 Kühn).
[23] Edition by F. Marx in *Corpus Medicorum Graecorum*, vol. I, Prooemium 8, p. 11 (= Diokles, frg. 4 Wellmann).

after 258/7, though it need not be long after, in view of the influence upon his writings of the doctrines of Diokles. Finally we may note that the comic poet Alexis, who was still writing in the 270's, quotes Mnesitheos as though he were a respected authority. Probably Mnesitheos was born *ca.* 320, studied under Diokles *ca.* 300-295, became prominent enough to be mentioned in comedy before 280, and made his greatest contributions in the 260's and 250's.

There can be no reasonable doubt, therefore, that Jaeger's hypothesis about the inscription was correct. It needs only to be modified to provide that the famous Mnesitheos was not the son but the grandson [24] of the dedicator of *ca.* 350, and that there was a succession of three, four, or more doctors in the family.

Dieuches is named immediately after Mnesitheos in three lists,[25] immediately before him in one; [26] and we have seen that their ancestors are closely associated in the inscription. No other chronological indications can be given until the fragments of Dieuches are studied by some expert in medical history.[27] All that is known of the family may be embodied in a *stemma*, where I have assumed that the famous Dieuches was a contemporary of the famous Mnesitheos.[28]

[24] It is unlikely but not impossible that he was the great-grandson.

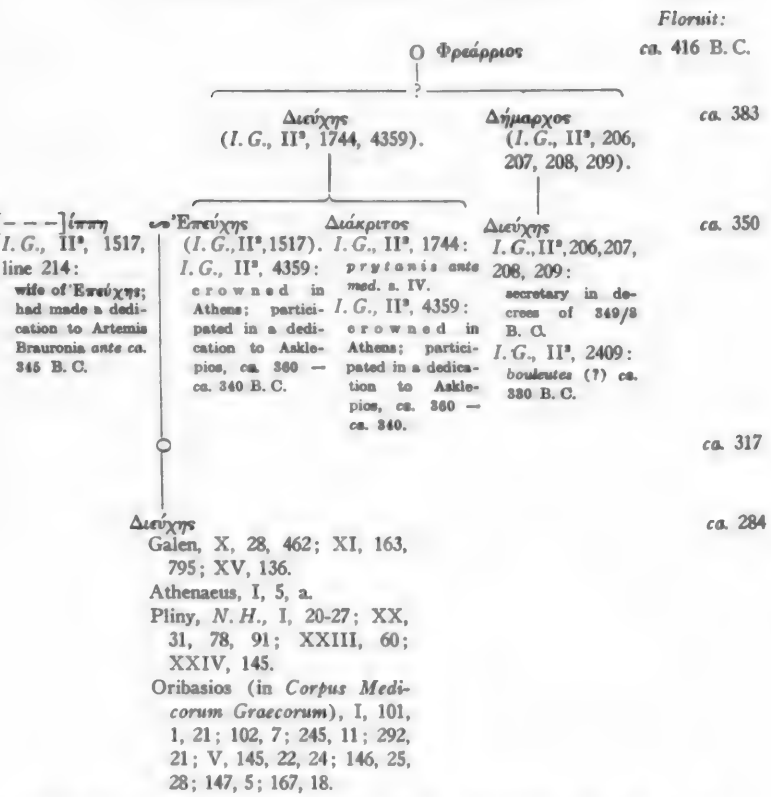
[25] Galen, X, 28 and 462; XV, 135-136.

[26] Galen, XI, 163.

[27] Galen XI, 795 has a list which places Dieuches before Diokles, but it also puts Pleistonikos before his master Praxagoras. There was often no need for Galen to cite his authorities in strictly chronological order.

On a very thin basis scholars used to "assign" Dieuches to a date in the third century B. C., usually to the earlier part of that century (F. Susemihl, *Geschichte der griechischen Litteratur in der Alexandrinerzeit*, vol. I, pp. 812-813. M. Wellmann, in Pauly-Wissowa-Kroll. *Realensyklopädie der klassischen Altertumswissenschaft*, vol. 9, col. 480).

[28] Since Epeuches has a name formed from the same root—a sort of "family root," as was usual—and since he is named first, he would probably be the one to transmit the name Dieuches to his descendants. The generations are reckoned backward and forward from *ca.* 350, the most likely approximate date for the inscribed relief. The family belonged to the deme Phrearrhoi, and a hypothetical ancestor may be indicated for the two known branches. It should also be stated that the Dieuches of the Demarchos branch seems to have followed a political career: the post of secretary was fairly humble and he can hardly have become a noted physician. The collection of references to the famous Dieuches is more nearly complete than any hitherto made. In Oribasios the references under "V" are re-


Floruit:
ca. 416 B. C.
Ο Φραάρριος
?
Διεύχης
(I. G., II², 1744, 4359).
Δήμαρχος
(I. G., II², 206, 207, 208, 209).
ca. 383
[– – –]ίππη
I. G., II², 1517, line 214:
wife of Ἐπεύχης; had made a dedication to Artemis Brauronia ante ca. 345 B. C.
ω Ἐπεύχης
(I. G., II², 1517).
I. G., II², 4359:
crowned in Athens; participated in a dedication to Asklepios, ca. 360 — ca. 340 B. C.
Διάκριτος
I. G., II², 1744:
prytanis ante med. s. IV.
I. G., II², 4359:
crowned in Athens; participated in a dedication to Asklepios, ca. 360 — ca. 340.
Διεύχης
I. G., II², 206, 207, 208, 209:
secretary in decrees of 349/8 B. C.
I. G., II², 2409:
bouleutes (?) ca. 330 B. C.
ca. 350
ca. 317
Διεύχης
ca. 284

Galen, X, 28, 462; XI, 163, 795; XV, 136.

Athenaeus, I, 5, a.

Pliny, *N. H.*, I, 20-27; XX, 31, 78, 91; XXIII, 60; XXIV, 145.

Oribasios (in *Corpus Medicorum Graecorum*), I, 101, 1, 21; 102, 7; 245, 11; 292, 21; V, 145, 22, 24; 146, 25, 28; 147, 5; 167, 18.

It will be noted from the *stemma* that the dedication by the grandmother of Dieuches, ——ippe, and the record of Diakritos as an Athenian councillor, both fall in the years before 345, while her husband's cousin (?) Dieuches is known in 348 and in *ca.* 330 B. C. These facts agree with the stylistic and orthographic evidence which led us to date the relief in the period about 360-340.

peated from Raeder's index at the end of his Part IV: they refer to his Vol. III. The references to pp. 145, 146, and 147 I cannot check: Dieuches' name does not appear on these pages.

Athenaeus, V, 212 e, was emended by Schweighäuser to give the name of a Dieuches, but Wilhelm showed that the correct emendation gives the name of a certain Δίης (S. Dow, *Classical Philology*, forthcoming).

The only known pupil of the famous Dieuches was a certain Noumenios of Herakleia, who may now be dated with assurance in the second half of the third century B. C.[39] Writings on the more strictly medical subjects were only a part of his activity; we may add that although through merit or accident a little has survived of his writings in this line, the absence of his name from all the lists of great physicians cited *supra* proves that he never attained first rank. Bred in a tradition which stressed the importance of diet, he was not entirely frivolous in writing on *Dining*. Better known then and now, and perhaps more deserving, were his compositions in verse, on *Hunting* and especially on *Fishing*. In his day and after, these were popular subjects; but it is hard to resist the suspicion that for medicine these interests represented the petering out of the great school fostered by such authorities as Aristotle, Diokles, Mnesitheos, and Dieuches.

[39] There is no article in Pauly-Wissowa, but full references are given by F. Susemihl in his *Geschichte der griechischen Litteratur in der Alexandrinerzeit*, vol. 1, p. 813; for the relations of Noumenios to other writers, see also vol. 1, pp. 301, 309 (note 144), 784, 879 (note 202); vol. 2, pp. 189 and 422. Much of what survives is preserved in Athenaeus.

AESTHETIC CONSIDERATIONS IN SURGICAL OPERATIONS FROM ANTIQUITY TO RECENT TIMES

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Erich Lexer, one of the most vigorous defenders of aesthetic principles in surgery, characterised the cosmetic end-result of an operation as "an always more appreciated requirement of modern surgery," and he condemned many old operative procedures because of their "careless incisions."

This judgment leads one to believe that aesthetic considerations in general surgery did not exist before recent times. This impression is completely wrong and it is a mistake to suppose that these problems formerly existed only in the restricted field of plastic surgery. We may well say, that aesthetic considerations in surgical procedures are as old as the science of surgery itself. They were carried through the centuries, modified by the different surgeons until they found definite help and further development through three great medical events in the second half of the last century—through the introduction of anaesthesia, of antisepsis and of X-rays. Thus the immediate and more remote dangers of surgical interventions were reduced and the aesthetic results improved.

I tried to look over the whole historical literature as completely as possible in order to see how much individual authors considered aesthetic principles. I was not a little surprised to gather a great many examples which I now summarize.

As there is a great deal of material, I had to omit some less important contributions or such as were mere repetitions of earlier ones. I only cite original suggestions or improvements or modifications of technique concerning cosmetic end-results.

We find the earliest notes in the Edwin Smith *Surgical Papyrus* (Fig. 1) which refers to the time of the pyramid builders, i. e. about 3000 B. C. We learn in this oldest known treatise of surgery how the old Egyptians adapted accurately the edges of a wound by means of special bandages and adhesive plaster in order to secure a smooth agglutination. In facial and other wounds even sutures were used.

Wounds of the earlobe were sutured from behind. Stitches which ran the danger of cutting through or yielding were reinforced with adhesive strips. Fractures of the nose-bone were lege artis reduced and held in normal positions by means of "two plugs of linen, saturated with grease," inserted into the two nostrils.

Avoiding disfigurement of the body was one of the chief objectives. "Many lovely ladies have spent uncomfortable weeks lying flat on their backs with a sand-bag wedged between their shoulder-blades, for if a perfect cosmetic result is to be achieved after the lady

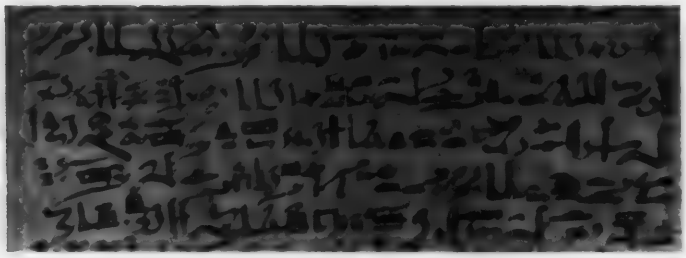

Fig. 1.

Section from the Surgical Papyrus "Edwin Smith" (Original about 3000 B.C.). This part deals with the correct setting of the broken collar-bone and considers its cosmetic result. (Reproduced from Breasted).

has sustained a broken collar-bone, no other method will so safely and surely produce the desired effect" (Graham). Cosmetic care was important. We find a prescription for removing the "wrinkles of the head" and "transforming an old man into a youth."

General surgery of the Ancient Indians was greatly influenced by aesthetic ideas, as we see in Suçruta's *Ayurveda*. In the treatment of abscesses, "the incision or opening of a swelling in its inflammatory or suppurated (lit. immature, unripe) state is attended with destruction of the local flesh. . . ." But the writer recommended opening the mature abscess with the knife and not to wait for its natural bursting. "An abscess or a swelling, due to the several Doshas (humours), which spontaneously bursts, may assume any of the aforesaid forms (elobated, rectangular, triangular, circular, crescent-shaped, extended, zig-zag-shaped, barley-corn shaped) while the incision by a surgeon's knife should never have a distorted

or an improper shape." "Incisions should be lateral (tirjek = transverse to the axis of the body) in region of the eye-brows, temple, forehead, cheeks, eye-lids, lower lid, armpits, belly and the groins. . . . An incision in any of the above mentioned regions not made as directed, may give rise to extreme pain, prolonged granulations and condylomatous growths in and about the ulcer. . . ." Wounds were not sutured before they were well cleansed of foreign bodies. There were different needles for sutures according to the tissues to be united. Even those with a "triangular body" were well known and served for suture of "fleshy" parts. The ancient Indians also knew various kinds of sutures, of which the interrupted and the continuous kinds were the most important. Even horsehair was used. The claws of a large ant (*Scarites Pyraemon*) served as a kind of primitive clip for closing wounds. A similar method was later used by the Arabs and many centuries after them in Vidal's serres fines and in their modifications by Herff and others. Suçruta who certainly preceded the Hippocratic School, attributed special importance to the avoidance of deformities and functional disturbances. "A tooth of a young person, not broken, but loose should be plastered with . . . , the loose tooth of an old man should be drawn."

We find a high standard of aesthetics in dentistry about the time of the founding of Rome (quoted from Castiglioni). This is proved by two facts—the finding of teeth capped with gold in the Etruscan tombs and the Roman Law of the Twelve Tables prohibiting the placing of gold in tombs except when it was set in a tooth.

While the Bible has very few references to surgical operations, the Babylonic Talmud gives a prescription for freshening the edges of old wounds to secure a quicker and better reunion, according to Rabbinowicz.

We frequently meet with aesthetic-surgical directions in the *Corpus Hippocraticum* (fourth century B. C.), especially in the books Περὶ ἰητροῦ (*De medico*), Περὶ ἑλκῶν (*De ulceribus*), Περὶ ἀγμῶν (*De fracturis*), Περὶ ἄρθων (*De articulis*) and in the Ἀφορισμοί. The pathology and treatment of the scar are discussed. The scar may be—with respect to the underlying disease, its localisation etc.—hypertrophic-keloid (ὑπερσαρκέω) or depressed (καῖλος) or extensive

in the width (πλάτος). The possibility of change into "beautiful scars" (οὐλαὶ καλαί) is mentioned. Round wounds with loss of substance (ἐκκοιλα) must be excised and the undermined edges removed. In the treatment of fractures, the proper position of fragments is emphasized. The least crookedness (διαστροφή) or shortening ("βραχύτερον") of the thigh or the tibia means a disfigurement (αἶσχος) which could not be hidden ("ξυγκριφθείη"). The same ideas are especially important in fractures of the nasal bone and of the clavicle. The Hippocratic writings emphasized here a problem often met in later literature and still important in our days.

About the beginning of the Christian era, the encyclopaedist Aulus Cornelius Celsus mentioned for the first time incisions to relieve the tension of shifted skin flaps which serve for primary closure (cancer of lips, defects on the prepuce etc.).[1] The technique of a "beautiful" suture is described. To ease the tension of the wound edges, the "flesh" as well as the skin must be fastened. No violence must be used in transfixing the needle through the tissues. The individual stitches should not be too far apart or too near one another to avoid gaps and stagnation of wound secretion. If it is impossible to bring the edges together because of strong tension in the skin or loss of tissue, the approximation of the edges has to be done by the "fibulae, ἀγκτῆρος Graeci nominant." With this method[2] the wound becomes straighter and the scar smoother. Pigmented or hyper-pigmented scars are considered unsightly and methods are recommended for their prevention and removal. Warts are first cut and then cauterized. This method used also in our times gives a less prominent scar than oval excision and suture. Atheromata are bluntly and integrally enucleated from their site. The ingrown nail is treated by excision of the lateral hypertrophic nail-bed. Shortening due to fractures is called "indecorum." To avoid later disfigurement, badly reduced fractures should be straightened while

[1] The name méthode française (par glissement) is misnamed (Forgue) and results from the fact that Celsus' works were not seen again till the beginning of the typographic era (first edition, editio princeps, Florence 1478).

[2] As in the past centuries the various writers today do not agree upon what Celsus meant by "fibulae." Some suppose it to mean a Situationsnaht like the sutura conservatrix of Guy de Chauliac, while others think it is a kind of long needle or clasp.

the callus is soft. In clavicular fractures with acute fragments, Celsus recommended incising the skin at the level of the lesion, resecting the ends of the fragments and putting the bone into the correct position. We find here the forerunner of the bloody reduction frequently used in our times for aesthetic reasons.

Heliodor lived in the beginning of the second century probably in Rome. One of his manuscripts is published by Sigerist. He studied—as Suçruta did before him—the directions for incisions in the different parts of the body to avoid greater damage.

Another source of knowledge about aesthetic ideas in general surgery is found in numerous writings of Galen. They were composed in the second half of the second century. We shall pass over Galen's general philosophical remarks about nature, art and aesthetics and deal only with purely medical subjects. He already distinguished two kinds of wound healing κόλλησις (prima intentio, agglutinatio) without substantia intermedia and the σνσσαρκώσις (secunda intentio, incarnatio), with more or less abundant formation of intermedial substance. Abscesses are to be opened by small straight incisions. In the removal of superficial tumours he advised elliptical (μυρσινοειδής myrtiform) incisions. Muscles were to be divided not transversely but lengthwise. Anatomy should be the firm foundation of any operation to avoid mutilation of the patient through injury to nerves and vessels. He emphasized the saving of the recurrent nerve in the removal of glands. His method of removing varicose veins was to introduce a bicipital probe (τὸ διπύρηνον) and a thread into the lumen of the exposed vessel. This procedure may be the prototype of our modern subcutaneous methods of varicectomy (Kellar, C. H. Mayo, Babcock). The application of this method presumed—as also to-day—veins with straight direction and no thick, locally limited knots. We see from a relief found in a temple near Athens about 400 B. C. (Fig. 2) that this kind of varicose veins was quite common. An incision embracing the whole length of a vein would leave a very unsightly scar and only a few decades ago, these long incisions were discarded a second time.

As regards our special subject, the proper Greek-Roman period of Antiquity closes with Antyllus who lived about the third century. We owe to him the first information about the transverse trache-

Fig. 2.

This relief from a temple near Athens (circa 400 B. C.) shows a vertical course of varicose veins. Galen recommended for their removal his bicipital probe method.

otomy [3] which saves the tracheal rings [4] and leaves the scar in a natural fold. He also described a method for removal of fistulae of the trachea, thorax and abdomen. Those leading to the bone were to be excised and the bone scraped. But if the bone showed traces of caries, the procedure should be carried down to the bone marrow and all diseased bone tissue should be removed by the gouge. Excessive skin after exstirpation of tumours ought to be removed. Incisions for abscesses should be directed transversally on the forehead following its natural folds. Incisions on the lower eyelid should be semilunar and correspond to the direction of the orbital margin in order not to leave any evident sign of scar.

The Greek Oribasius (325-403) mentioned for the first time osteoclasy to improve permanent deformity of the limbs after badly reduced fractures. He also described a method for the subcutaneous removal of varicose veins which may have been based on that of Galen.

Paulus of Aegina (625-690), physician in the Greek-Byzantine period, even suggested the removal of excessive disfiguring callus by the chisel. A semilunar incision on the posterior insertion of the auricle should open the external auditory meatus for removal of foreign bodies. He considered the umbilical hernia (*ἐξομφάλων*) as unsightly, and performed a circumcision of the hernial sac followed by ligature. Thus the hernial sac together with a great deal of the umbilicus sloughed off by necrosis. But as the umbilicus itself was considered an important point for the aesthetic appearance of the body, Paulus of Aegina tried to form a new one: he put a crossing suture for the express purpose of obtaining as depressed a cicatrice as possible ("*κοιλοτέραν . . . οὐλὴν*"). For the removal of gynaecomasty, he advised a lower semilunar or elliptic incision.

Some aesthetic principles in Arabian medicine appear later, although the Arabs did not display much originality. They were generally preservers and propagators of the Greek and Roman works. The most famous among the surgeons was Albucasim (936-

[3] Of Asclepiades Bythinus, the real inventor of the tracheotomy, no writings have been preserved.

[4] The Ancients held the erroneous conception that cut cartilage would not re-unite by healing.

1013), whose suture technique shows a great aesthetic comprehension. Pedunculated fibromata were removed by ligation, and he emphasized the early removal of warts and excrescences because they

Fig. 3.

Incision for operation of gynecomastia, already mentioned by Paulus of Aegina, was illustrated by Albucasim about 990. (Page of Johannis Channing's edition of the MSS. Bodl. Huntington 156 and Bodl. Marsh 54).

may continue to grow and degenerate into malignancy. As long as they are small, they can easily be removed without disfigurement. Suppurative mastitis and gynaecomasty is treated by a semilunar incision (Fig. 3). Closed osteoclasy was considered too dangerous

and the bloody method for removal of the deformity was preferred. Albucasim was largely concerned with preservation and aesthetics in dental care as well and for this reason tried to avoid extraction of teeth. But if they had to be extracted, he advocated a method for their artificial replacement.[5]

In the School of Salerno, Trotula,[6] female surgeon and gynaecologist in the eleventh century, spoke for the first time of a perinoraphy lege artis after a previous delivery with perineal laceration. She emphasized the importance of after-care so that stitches might not tear out.

Another representative of the School, Rogerius,—latter part of the twelfth century,—united facial wounds with a fine needle and silk by interrupted or continuous stitches lying in a stuellus (strip of linen). The Quatuor Magistri, his commentators in the thirteenth century, suggested a special procedure in case of "nose-polyps" which cannot be completely removed through the endonasal way. The nose was split in a longitudinal direction. After the removal of the tumour, the wound was closed by a very fine and exact suture which began from below (edge of lip) and lay in the aforesaid linen strip.

In the thirteenth century, the School of Salerno was superseded in importance by that of Bologna (founding of the first University) and other cities. Hugo de Lucca—founder of the Bolognese School—treated wounds only with wine and exact suture without adding any other remedy and he thereby obtained "pulcherrimas cicatrices." Teodorico, his son, repaired a partially severed nose by careful sutures and by exact adaptation of the corresponding wound edges, especially in the midline. He then inserted tampons moistened with wine into the nostrils. He did not put any drainage strips into the sutured wounds for fear of hindering the agglutination and consolidation of the wound borders, or causing disfigurement through suppuration ("deturpare membrum"). Wounds with loss of substance

[5] Already suggested by Hippocrates.

[6] There is some question as to the real existence of Trotula. The suggestion has been forwarded that according to a common habit of the Italian School, the works of Trotus may have been spoken of as "Trotula" (Singer).

were stimulated to contract by certain remedies in order to limit the size of the scar.

Bruno da Longoburgo, a contemporary of Teodorico, did not put moist dressings on the stitches because of the danger of maceration and infection(?). He emphasized a dessicative treatment like his classical predecessors. The stitches were left until the eighth day.

Guglielmo da Saliceto, another contemporary, recommended the "suture de pelletier" in delicate wounds as it leaves "more beautiful scars." He used waxed silk because it is more durable and cuts the skin less than do bristles which were sometimes used for sutures.

His pupil, the Milanese Lanfranchi (Fig. 4), banished from Italy, brought Italian surgery to France. He devoted himself particularly to suture technique. The needle had to have at its eye lengthwise "sulci" (grooves), so that the thread rested in them and remained flush with the needle during the passage through the tissue. The thread had to be twilled and free from knots. Lanfranchi first described the surgical knot and originated the four-stitches or U-suture to avoid laparocele.[7] In deep wounds the stitches had to include also the deeper tissues because otherwise cavities (dead spaces) with collection of blood might easily have formed and hindered the healing. Regarding facial wounds he said: "Quod sutura que fit in facie sempre debet esse facta subtilius et melius quam in vulneribus aliorum membrum." He sutured wounds round the mouth very carefully as distortions ("tortuositas") in this place are particularly disfiguring, especially while talking. Lanfranchi, very originally used the "sutura sicca," the "dry stitch"[8] (Fig. 5), to avoid scars of the stitch canal. Other cosmetic suggestions attributed to him are e.g. special dressings in the hypertrophy of the female breast for having it regain the normal shape.

With Lanfranchi comes the rise of French surgery which has taken the lead for many centuries. Later Italian surgeons of merit devoted themselves more to the study of anatomy and less to the exercise of practical surgery. In other countries like Germany, England, Bel-

[7] This suture, also called mattress-suture, is generally known by its rediscoverer Lexer.

[8] Also this suture has been frequently claimed as a new discovery in recent times (1934).

gium, Switzerland, etc. surgeons emphasized aesthetic ideas. They probably kept in touch with each other, judging from the quotations in their works. For this reason we shall henceforth set down this

Fig. 4.

LANFRANCHI

Professor of surgery at Paris (13th cent.).

account in chronological order and not divide it according to schools and countries.

A contemporary of Lanfranchi, the French Surgeon and Anatomist Henri de Mondeville, has left so many aesthetic ideas in his writ-

ings, that we can quote only a few here. An addition to a detailed discussion of the directions of incisions, he gave a careful description for the removal of superficial tumours. He condemned the cross

Fig. 5.

This illustration of the "dry-stitch" (as used by Lanfranchi for avoidance of scars of the stitch-canals) is taken from Ambroise Paré's *Œuvres*, second edition, Paris, 1579.

and the angular incisions because of the "cicatrix turpis" showing many wrinkles. Then, too, simple incisions he thought had a disadvantage as the excessive skin would form folds. He mentioned surgeons on the other hand who removed the tumour together with

the covering skin and " turpissimum faciunt cicatricem." De Mondeville, who wished to be considered as very progressive, calculated before any operation how much excessive skin would be available and drew the lines of the incisions by " incaustrum " (ink) or similar means. For the modern treatment of wounds he stressed 11 points of which two may be quoted here: " . . . facit pulchras cicatrices non concavas . . . non destruit motum membrorum nervosum." The earlier wounds are united by suture, the better and the more quickly they will heal. Regarding the site of the injury, the treatment must be " in membro nobili ut facie alie in non nobili ut coxae." He also distinguished between persons in whom an inconspicuous scar is necessary because of professional reputation, social contacts and those who were disinterested in such matters.

The English surgeon Gaddesden (Joannes Anglicus, 1280-1360) also advocated the value of less noticeable scars and described means and procedures for preventing unsightly cicatrices. He advised that stitches be withdrawn before they cut the skin, furthermore that the paronychia be cured in a manner which preserves the nail, the loss of which would be a cosmetic disfigurement.

His compatriot John Anderne may be called a forerunner of our modern aseptic wound treatment. According to him, wounds should heal without suppuration and local applications and dressings should be used as little as possible.

While Johann Ypermann, " le père de la chirurgie flamande " gave only a few original hints of plastic surgery, his contemporary, Thomas Scellink of Thienen, recommended opening abscesses by cauterisation and he covered the surrounding skin with dough to protect it against corrosion. Concerning the fracture of the clavicle he emphasized correct reduction of the displaced fragments: " Ende dan suldi die broke effenen met uwen vingheren alsoe alst betaemliic is soe datter geen oneffen (heit) en blive noch gheen dale." [88a]

The French Guy de Chauliac (1300-1368) required much care for the treatment of facial wounds, " quia est membrum decoris, et honoris, ita caute tractatur quod uniones et cicatrices non fiant

[88a] Translation: And you should reduce the fragments with the finger in such a way that neither bulging nor depression occurs at the place of the fracture.

turpes." He too preferred the dry stitch. In his writings we find for the first time a description of the suture known as "quilled suture" which is still used in our day in the form of our button-suture or other stay sutures to relieve the tension on the wound edges. The interrupted suture is done in such a way that the first stitch is made in the middle of the wound so as to get an exact adaptation of the corresponding parts of the borders. He used also the "sutura conservatrix," a suture which corresponds in its purpose to the ἀγκτήρος mentioned by Celsus. The needles should be polished and flat in

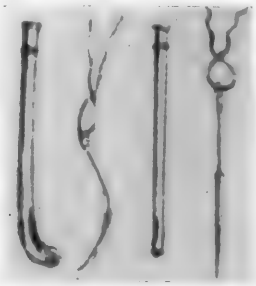

Fig. 6.

Guy de Chauliac's perforated tubes which were supposed to avoid tissue damage through suture.

addition to the other usual requirements. To avoid pulling the skin during the passage of the needle, he described a "windowed" (perforated) tube (Fig. 6) to fix the skin against the needle point. This was a forerunner of our modern wound forceps, especially of the model which I recently described. He even used primitive clips for the closure of a wound. In fractures of the collar bone, he also emphasized the bloody reduction and fixation. But he added that despite all these methods "il y demeure quasi tousiours déformité."

Nicolaus Florentinus, living in the second half of the fourteenth century, rejected the continuous suture because the tearing of one stitch may be followed by relaxation of all others. One volume of his *Great Surgery* is a veritable textbook of plastic surgery (*De decoratione e corporis ornatu*) in which he deals with "de pulchrificandis cicatricibus." He sutured only large recent wounds, in older

ones he refreshed the edges. Thus his wound treatment did not differ from our modern one (primary wound excision by Friedrich 1895). But Florentinus based his surgical procedures on purely empirical principles while we base ours on scientific knowledge. Resembling him is his younger fellow countryman Pietro d'Argellata, who compiled a number of contraindications for the primary wound suture, e. g. lacerated wound edges. He believed that ear and lip wounds must be exactly united to prevent disfigurement (" deformitas "). All his ideas about the treatment of facial wounds resemble those of Guy de Chauliac.

We learn cosmetic surgical observations from one of the earliest German works, the book of Hieronymus Brunschwig (1497) which became well known through the publishing of a facsimile reprint in 1911 by G. Klein and in 1923 by Sigerist.[9] While surgeons of his time removed the bone in compound fractures, Hieronymus was more conservative: he left this bone in place to prevent disfigurement unless there was absolutely no hope for its reattachment. Cleanliness in the meaning of our asepsis, was for him the conditio sine qua non of smooth and aesthetic wound healing. He used thin needles in facial sutures and added the dry stitch as reinforcement when the wound edges were in danger of tearing through tension. Some of the phrases written in his own Alsacian dialect will prove better than all descriptions the high standard of his aesthetic ideas. " Wan die hüpsche des angesichtz vber alle andere ding den mensche hübsch machet vnd ein wol gestalten menschen vnd schön wider das widerwertig. Dar vm ist noturfft dem wund artzet das er grossen flisz hab in den wunden des angesichtes das kein schnöde oder vnreine vereinigung oder gestalt da werde / wan es ist ein gelidt d' gezierd. . . . Wo es dan müglich ist so werd sie zu samen gefüget vnd gehefftet mit einer subtilichen hefftung . . . mustu alle wunden des munds/wie die verwunt werden, so soltu sie mit grosser fürsichtigkeit hefften / besunder die erste hefft solltu anfahen an dem nesten ende des munds / vnd hinder sich hefften vber sich

[9] The book appeared also in English (1525). I regret to state that I have not seen it. According to Billings, its title begins as follows: *The noble experyence of the vertuous handywerke of surgeri practysyd and compyled by the most experte Meyster Iherome of Bruynswyke borne in Straesborowe in Almeyne etc. etc.*

vnnder sich oder neben sich vff das der munt nit gerumpfen oder knörrecht werde/oder ein vngeschickliche form gewin so er würt reden." [10]

It might be of interest to mention a few of the surgeons living at the end of the fifteenth and the beginning of the sixteenth century:

De Vigo removed stitches between the third and the sixth day replacing them by strips of adhesive. Tagault refreshed old wounds before their suture and treated old scars differently from new ones. He also made incisions "secundam rugam." Jacobeus Hollerius, professor at Paris, agreed with this. The Spaniard Arceo deplored bitterly the treatment of wounds in Spain in his day. Injuries were sutured with thick needles inserted deeper than was necessary; the wound edges were not reunited with their corresponding parts but obliquely and irregularly; bones and parts of soft tissue were completely amputated even when only partially torn off (tip of finger); the after treatment consisted of drugs, the sutures were neglected, ulcerations and losses of substance were usual. Thus the scar looked worse than the original wound.

Walter Ryff (first half of sixteenth century) treated mastitis by high binding of the breast. He operated only when pus was definitely present, with an elliptical incision in the lower part as done before him by Paulus von Aegina. We find in his *Teutsche Chirurgie* (1545) a picture of primitive clips "häcklin" (Fig. 7), similar to those described by Guy de Chauliac. They resemble the Michel-clips but their ends could not be clipped together. They were of different sizes but Ryff did not believe in their cosmetic effect for they usually left large scars ("gemeyniglich doch grosze narben").

Günther von Andernach compared the different instruments used in the different countries, e. g. scalpels. He described the incisions carried out with them as related to the extension of the wounds and suggested that the choice of the instruments should depend on

[10] Approximate translation: Human beauty is expressed in face and well-formed body. Therefore, O physician, be careful and diligent in caring for facial wounds. If possible put very fine sutures. In wounds of the mouth, start with the first stitch in one corner and then put stitch after stitch, very near one another, below, above, on the sides so that the mouth keeps its nice form even if the person is going to speak.

the region of the body on which they were to be used to avoid unproportionate scars.

Marianus Sanctus Barolitanus, an Italian and known mainly through his lateral lithotomy, emphasized the careful adaptation of wound edges for aesthetic, not only functional reasons: " quando non solum utilitatem, sed etiam formam membri conservare debemus, pulchramque cicatricem inducere, quod proprium est medici chirurgici. . . ."

Looking back over the centuries we see that cosmetic considerations were confined chiefly to the treatment of wounds. This was

Fig. 7.

Primitive skin clips of Walter Ryff (16th century).

natural. The treatment of wounds occupied first place in surgery due to the large number of wars, crusades, the invention of gun powder, tortures etc. One of the most commonly known punishments in the Middle Ages was the amputation of the hand at the wrist. Aesthetic considerations went so far as to describe how a hand should be cut off so that the edges could later be drawn together.

A revolution in medicine was brought about through the Swiss Theophrastus Bombast von Hohenheim (Paracelsus, 1493-1541). In the first place he overthrew all previous ideas and practises dealing with the treatment of wounds and their sutures. He presented the point of view that nature accomplishes the healing and that it is the task of the physician not to interfere with this natural process. Thus he opposed excessive manipulation of the wound. He won followers and established principles especially with reference to after-treatment. These are still of value in obtaining cosmetic results. He fought against the frequent changes of dressings and the repeated touching of wounds. He probably thought of keloidal

degeneration: "Gayl flaysch" granulating from the wound, is impaired ("gebösert") by cauterisation and excision. He opposed the suturing of wounds because "kain wund hailet dester eher noch dester subtiler, sondern unglückhafftiger und erger." The writings of some of the physicians of Paracelsus' time show clearly to what considerable degree the idea of cosmetic prevention determined the choice of surgical method.

Paracelsus' disciple, Felix Würtz, softened his teacher's principles. He accepted the suture for plastic operations—for the fixation of flap wounds and partially amputated organs (nose, ears)—but recommended the avoidance of close sutures and compressing dressings which could interfere with the nourishment of the tissues. He advised only a few "häfft" (stitches) in the face. These were to be removed early because when torn they left "sehr häszliche ungestalte schrammen oder narben" (deforming scratches or scars). A gaping wound retracts itself naturally but the sutured one leaves a scar and every suture a "sonderbares anmal oder narben; daraus eine grosze ungestalt nachmalen entsteht." He explained that the great number of stitches used in injuries by surgeons of his time were only put in to increase the amount of fee. This custom probably gave rise to the proverb: "jeder Heft ein Batzen" (every stitch a coin).[11]

Würtz also made the important observation that wounds in persons suffering from "mal français" have a poor tendency to heal ("keine gemeine heylung"). In injuries of the nails he stressed conservative treatment with adhesive and wax dressings to prevent the nail from becoming rough ("rauh und schieferig").

Thomas Gale refreshed the edges of old wounds (as already stressed in the Talmud) and he favoured the advantages of the dry suture: "We wyll not have the cicatrice to be seame as in the face." In addition to exact adaptation of the edges, he recommended the following manipulation so familiar to us: "The forthe kynde is

[11] A simular opinion was held by Bartholomeo de Aguero of Seville (about 1600). He fought against his contemporaries in his *Via particular contro la commun opinion*. It should be noticed that this unworthy practise exists even in our times, at the expense of the healing. Thus according to Christopher: "The pernicious practise of certain insurance companies of paying so much per stitch has induced men of a certain type to put in unneeded stitches."

done by hokes, great or lytle, accordynge to the bygnes of the wounde, the hokes must be crocked and at both endes. You shall faste an hoke on the one syde of the wounde, and drawe the other ende towards tother syde, in wyche you shall fasten the other hoke. This kynde requyreth no violence, but only serueth where as the wounde wyll easelye come together." Concerning the suture he repeats Guy de Chauliac: "Let your thread be even without knots, and make the first stitch in the middest of the wound that it may not be drawn awail and the members lose its beautie."

Ambroise Paré (1510-1590) is the famous surgeon of the Renaissance and the founder of modern surgery in France. He renewed and widely corrected many special surgical branches. His aesthetic ideas concerning general surgery do not reveal as much originality as they do in purely plastic surgery. He preferred the dry stitch in the face "des belles demoiselles," illustrating this by a charming drawing (Fig. 4). In operations of the lip, he used Celsus' method with relief of the tension of the wound. He made incisions "selon les rides du cuir." He did not remove the nail when ingrown but only the hyperplastic soft tissue. In the pharmaceutic treatment of wounds Paré held the views of Paracelsus, requesting simple treatment and the least possible interference with the process of healing. Experiences in war-surgery led him to these conclusions.

Paré's contemporary, the Italian Andrea dalla Croce, also urged the necessity of invisible scars and stitch canals in the face and he studied the pathology of the "cicatrices deformae atque indecorae."

Falloppio did likewise. He considered in detail the prevention and treatment of scars and mentioned especially the keloidal degeneration. In facial wounds caused by gunshot he insisted upon a thorough cleansing so that the scar would not bear the black marks of the gunpowder later on. In wounds of the lip, his suture included the mucous membrane to prevent a later fissure or an oblique mouth. In the transverse cut of the neck, he also sutured the muscle in addition to the skin: "nam vidi ego sectos per transuersum prorsus, et consutos fuisse, atque agglutinatos, et suum munus, ut antea, obisse." His ideas about the maintenance and restoration of the aesthetic forms of the body rather than those of the skin are de-

scribed in his *Tractatus de decoratione* (treatment of obesity, excessive leanness, muscular atrophy, massage, gymnastics etc.).

Hieronymus Mercurialis, in his *De Decoratione*, gave a general view of aesthetics in Antiquity and contemporary surgery. He referred to the philosophy of Plato and Galen and explained the natural connection between nature, beauty and medical science: " Solus est Deus omnipotens et natura, quę, vel qui pulchritudinem in corporis fecit: medicus uero ille est, qui vel amissam quodammodo recuperat, vel praesentem ab omnibus iniuriis tuetur. . . . "

The Swiss surgeon Felix Plater thought that the struma was " indecora " but as its removal is dangerous, he recommended it only in case of dyspnoea.

Gourmelen was not very original in his request that abscesses be incised in a fold of the skin and in a direction parallel to that of the muscle fibers. Chaumette, of the same period, entirely disagreed with Würtz about the suture of facial wounds: " frequentioria et propinquioria sint suturae puncta; sic enim firmius glutinabitur." Reulin, French contemporary of Plater, repeated the idea of covering scars by folds of the skin and advised " aux escrouelles des aiselles et des seines on fait la section traversiere, à cause de la reduplication de la peau " (quoted by Gurlt).

Fabrizio d'Acquapendente also studied the aesthetic treatment of facial wounds and explained how to avoid disfiguring scars. He stated that depressed scars arose from loss of substance or suppuration; that scars with inverted edges and the " cicatrix eminens " were always due to the fault of the surgeons who put one edge over the other or did not cauterize the carnis luxurians in time; that it was easier to correct fresh scars than old ones. He described an instrument for the removal of nasal polyps which spared the nasal cartilage.

The French François Rousset and the Belgian Fyens, both of the sixteenth century, marked by 4 or 5 transverse lines the points which were to be sutured in laparatomies (e. g. Caesarian sections). Thus when closing the corresponding points were easily found. Theodor Kocher and Kirschner advocated the same technique 300 years later. We find a very instructive picture of this procedure in Scultetus' *Armamentarium Chirurgicum* (Fig. 8).

Roderico de Castro tried to distinguish between benign and malign tumours of the female breast. He operated the " cancer " only if not adherent to the surrounding tissue. He did not leave any visible scar when he removed the apparently benign tumours, because he approached them from below (transmammary), maintaining the nipple.

Fig. 8.

From *Armamentarium Chirurgicum* of John Scultetus (French translation 1675). Expresses the idea already mentioned by François Rousset (circa 1550): to design a few points across the incision line in order to find easily the corresponding parts of the wound edges.

Zaçutus Lusitanus, Portuguese of the same period, discussed the length of incisions of abscesses: " ita sit magnus, magnum fiat foramen, si paruus paruum." Describing the direction of incisions, he emphasized " secundum rectitudinem fibrarum " and not " musculorum " as taught by his predecessors. Thus we can suppose that he might have considered the fibrous structure of the corium. We are strengthened in this assumption when we read a work on struma [12] by André du Laurens who treated this argument more in

[12] Struma in the belief of that time as still used in the English language, meant generally enlargement of glands (scrophulae), not enlargement of a paryncymatous organ with internal secretion as thyroid or suprarenal gland.

detail. He suggested removing glandular tissue by single straight incisions parallel to the fibres. Thus he made transverse incisions at the neck, in the axillary cavity and in the inguinal region. Since there are no muscles with a transverse direction covering the glands and since the direction of the vessels and nerves is opposite too, André du Laurens might have thought only of the fibrous structure of the corium. In detail he wrote: "In transuersum si in collo axillis and inguinibus administrari debeat, quia earum partium fibre transuersę sunt at hęc in chirurgia lex statuitur, ut secundum fibrarum rectitudine fiat sectio."

This point is thoroughly treated in this paper because it marks the beginning of scientific work on the retractibility and cleavibility of the skin and how this new knowledge was practically applied. Remarkable research and discoveries in this line were made later by the following: Bichat, Dupuytren, Malgaigne, Langer and Kocher.

Peter Lowe, Scot of the 16th century, emphasized the value of the dry suture in facial wounds. He copied one of Paré's drawings (Fig. 4).

Fabricius Hildanus, the most prominent German of this epoch, avoided adhesions after burns of eyelids, lips and fingers by the application of linen or thin plates of lead.

Joseph de la Charrière, as Fabrizio d'Acquapendente, considered those surgeons slipshod who failed to adapt carefully the wound edges and he blamed them for the deforming scars which resulted. Daniel Sennert did not suggest anything new but he stressed wholeheartedly the importance of aesthetic aspects in general surgery.

In the seventeenth century studies in anatomy and physiology were progressing well but scientific work in surgery was very poor especially in the first half of the century, due perhaps to the Thirty Years War. The French surgeons in the eighteenth century took the lead (Académie Royale de Chirurgie founded 1831 by La Peyronie). English surgeons played a less important rôle. Other countries contributed only very little in the further development of surgery.

Of the early writings of this period, the *Surgeon Mate* (1617) of the British army-surgeon John Woodall deserves consideration. He

regretted the impossibility of using the dry suture in facial wounds at sea. He used "causticke" incisions for opening abscesses. The introduction of a "tent" (kind of drainage tube) was unnecessary as "it hinders the unition of the disjoyned parts detracting healing" and leaves fistulae.

James Cooke of Warwick spoke in his *Marrow of Chirurgery* (1648) about the direction for the incision of abscesses: ". . . in the Head, according to the position of the Hair, length-ways. on the Eye-lid transverse . . . on the sides (of the abdomen) somewhat oblique, in the Groines transverse." About facial wounds he said: "Wounds of the face are to be carefully dressed, otherwise they leave deformity."

Cesare Magati of Ferrara followed the ideas of Paracelsus claiming best the "rara medicatio vulnerum." He removed stitches from wounds in the cheeks on the third day to avoid visible scars.

Marc' Aurelio Severino summarized all the previous experiences for the direction of incisions: "Se si deve poi fare la ferita retta o trasuersa, o obliqua, il dimostraronno le figure delle parti, le gointure, le rughe della pelle, le fibre dei muscoli, le arterie, le vene, i nervi, i tendini ed altri corpi, che sono al di sotto." [128a]

John Schultes or Scultetus operated a cystic tumour of the cheek (gravitation abscess originating from the upper jaw or os zygomaticum?) from the oral cavity to prevent external scars in "une noble et très honneste dame." His report is illustrated by a very instructive sketch (Fig. 9).

Richard Wiseman, known as the "English Paré," discussed the aesthetic treatment of facial wounds. Alexander Read of Scotland who received his diploma about 1620 at Oxford, declared the face "as seat of Comeliness and Beauty" and recommended "special care that you leave no foul cicatrix after the cure."

Paul Barbette, son of a Strassbourg surgeon, practised about the middle of the seventeenth century in Amsterdam. He stressed, as many did before him, the necessity of following set directions for

[128a] Translation: It depends upon the particular place of the body, upon the joints, folds of the skin, fibres of the muscles, arteries, veins, nerves, tendons etc. if the incision has to be straight or transverse or oblique.

incisions. Cornelius Solingen of the Hague gave a very impressive and in some parts very drastic description of aesthetic principles. His conception of the skin structure as compared with the ideas of Du Laurens was outmoded: he did not recognize a special direction of fibres but only a "textur." However he too tried to incise in the natural folds of the skin to obtain less noticeable scars: "in den beiden Hypogastriis, schrat / nachdem sich die Haut zusammen giebt oder faltet. In der Schamseite (groins) schrat mit guter Vorsicht.

Fig. 9.

Opening of cheek abscess from within the mouth.
(From Scultetus, *Armamentarium Chirurgicum*).

. . . An der Stirne / muss man die Oeffnung allezeit machen nach den Falten oder Runtzeln der Haut / denn wegen des vielfältigen Zusammenziehen und Runtzeln der Stirne / würde / wann man einen geraden (vertical) Schnitt machte / die Narbe sehr gross werden / und eine Ungestaltheit verursachen. . . . In dem Angesichte muss man auch den Falten folgen / und die Oeffnung / so klein als es möglich ist / machen. . . ." In boils of the forehead: ". . . sonderlich bey Mädgchens / weil selbige ohnedem schön von Angesicht seyn / mit einer Lanzette die Beule so hoch man kann / nur so weit öffnen / als es zur Ausführung der ausgeflossenen Materie von nöthen ist / damit keine grosse Narbe drauf folge / und dieselbe noch mit den Haaren könne bedecket werden." [13] In the treatment of

[13] Approximate translation: ". . . put an incision in the lower abdomen according to the folds of the skin, in the groins oblique and very carefully, on the forehead always transversely. If it is done vertically, the scar will seem very large

varicose veins he was satisfied with the puncture and the compression dressing, believing the treatment of the " old surgeons " (total excision) too " cruel." He spoke about the fracture of the clavicle: " Dieser Bruch wird gar selten / man mag auch so viel Fleiss / Mühe und Vorsichtigkeit anwenden / wie man will / ohne Ungestaltheit heilen." [14] It would seem that he made use of the bloody reduction but he did not recommend it because of its danger. In cancer of the lips, he advocated total excision with the knife (not with scissors) in the healthy tissue, as there is enough skin for the final closure of the wound. He opposed surgical treatment of tumours on the neck because of the remaining external scar. He himself suffered from a tumour in this place. It developed after a trauma and he treated it only conservatively (to our mind with strange and doubtful procedures). He condemned " gewisse Chirurgos und auch andere ihres gleichen loses Gesindel welche alles was ihnen nur vorkommt / einen Krebs nennen / und mit solcher Behendigkeit drüber herfahren / gleichwie der Schlächter sein Fleisch zerhacket. . . . [15] He disagreed with the " old surgeons " in regard to the operation of gynaecomasty, even against its conservative treatment, as stressed by Fabrizio d'Acquapendente: " Ein guter Hollander mag wohl Bauch / Arsh und Brüste haben / und wenn er gleich die durch Essen und Trinken hätte bekommen / so würde er doch keine Medikamente drauf legen / viel weniger lassen abschneiden." [16]

Pierre Dionis, teacher of anatomy at the Jardin du Roy, advised (as Suçruta did) a small lancing of breast abscesses as soon as fluctuation appeared. To wait until the pus discharged spontaneously from several points would only lead to a " pitoyable délabrement " of the breast " qui font un des principaux ornemens de la femme."

and unsightly, for the wrinkles and the movements of the forehead have a transverse direction. Make sure that you follow the natural wrinkles in facial incisions. Open boils on the forehead of good-looking girls as high as possible, so that they can later on cover the scar with their hair."

[14] The clavicular fracture will always leave some deformity even if treated very carefully.

[15] He condemned certain surgeons and easy-going people who immediately call everything they see a cancer and treat it as a butcher does when cutting meat into pieces.

[16] Even when a good Dutch burgher developed big belly, backside and breasts through overeating, he would refuse any medical or surgical treatment.

His German contemporary Lorenz Heister also urged the early opening of abscesses with the scalpel and added: [17] " But the Incision ought always to be made in the lower Part of the Breast, unless Necessity obliges it to be otherwise, lest there should be left a visible Cicatrix after the Cure. Though there are not wanting some Surgeons who use the Caustic for opening Suppurations of the Breast, yet as they usually occasion indecent Cicatrices, we think the Knife is greatly preferable to such Medicines. " Thus Heister [18] spared the breast from deforming scars and is the forerunner by more than 150 years, of the ideas of T. Gaillard, Thomas, Bardenheuer, Hopmann, Warren etc.[19] Other aesthetic problems which he discussed will not be described here in order to avoid repetition.

David Turner who received the doctor honoris causae of Yale College in 1720, put great stress on the exact suture of facial wounds and recommended the dry suture in special cases: " Cicatrix or Scar, the smallest of which, in some Parts hereof, takes off from the Grace or Comeliness of the whole Visage, and is therefore as much as possible to be prevented."

Another contemporary, René Jacques Croissant Garengeot sacrificed but little skin, incising and preparing it over small tumours of the breast and the face to obtain a satisfactory cosmetic result. He had seen this method used by Petit.

For George de La Faye, the " prévenir la difformité " was an essential fact in operations. Incisions of abscesses followed the " rectitude des fibres des muscles et des plis de la peau."

We find many other aesthetic statements about treatment of wounds, scars, abscesses, direction of incisions etc. by Zacharias Platner of Leipzig, the English Samuel Sharp, Latter, Benjamin Gooch, and by many of the members of the Académie Royale de Chirurgie de Paris, such as Henry François Le Dran, Antoine

[17] Quotation from an English translation because the German or Latin edition was not available.

[18] Before Heister, these ideas were already expressed, as I said, by Paulus von Aegina, Ryff, De Castro, perhaps less explicitly.

[19] The method of Desmarest (1914) frequently quoted especially in American monographs, is a repetition of the method published by Bardenheuer and Hopmann (1903) and not an original idea.

Louis, Pribrac, Fabre and by the permanent winner of the academic prize, Claude Nicolas Le Chat. All of them lived in the 18th century.

The German military surgeon Johann Leberecht Schmucker said of atheromata: " if these tumours are in the face, an operation should be carried out so that the face is not disfigured." Johann Ulrich Bilgner, also a military surgeon, in his book *De amputatione membrorum rarissima administranda aut quasi abroganda* stressed energetically conservative treatment especially in the surgery of the extremities as done by White. His ideas were later supported by Brodie, Syme, Fergusson. This teaching is in strict opposition to those surgeons who perform an operation only for its own sake without considering the consequences. It is not merely a joke that Lisfranc complained deeply about the disappearance of the Napoleonic grenadiers who had such excellent thighs for amputation!

Percival Pott from the St. Bartholomew's Hospital in London, wrote: " . . . and as a wound made by knife leaves a much less disagreeable scar than that which necessarily follows the bursting of the skin, on being a mere simple division, the other a loss of substance, it will always be found best to anticipate the accident of bursting, by making the opening as soon as the teguments are in such a state as to threaten it."

We find a good drawing of an operation on a lacrimal fistula by Natal Giovanni Pallucci (Fig. 10). He used an aesthetically correct incision and deplored the cosmetic results of previous methods.

Giuseppe Bianchi, pupil of Nannoni and contemporary of Pallucci, reported that many surgeons of his time feared the development of an ectropion after operation on a lacrimal fistula and he quoted one case in which it appeared after " un amplo taglio che un Cerusico fece nella palpebra inferiore per dar escito alle marce."

John Hunter, son of a Scotch farmer, also considered cosmetic views in general surgery. He therefore treated scrophulae, for example, with a conservative method because when opened by incision or spontaneously, they showed a tendency to abscess formation which made them look uglier than before.

In abscesses of the breast, Raphael Bienvenu Sabatier, a pupil of Petit, emphasized that they be opened without scruple as scars in

this region were not apparent and as the mamma had the tendency to return to its normal shape. This learned author [20] who recognized aesthetic requirements in other regions of the body, might have followed certain rules before making such a bold assertion.

Fig. 10.

Direction for incision of the canalis lacrimalis (Pallucci).

While John Bell of Edinburgh cautioned his students to consider the cosmetic after-effects before performing an operation, John Abernethy, pupil of Hunter, expressed our modern idea about the treatment of gravitation abscesses. He had observed that fistulae formed when these abscesses were left to themselves and opened spontaneously. These fistulae were then chronic and had a very ugly appearance. How could he avoid them? He tried first to needle the abscess in a vertical direction. Again formation of fistula resulted for this was the easiest way for the pus to discharge. But

[20] His textbook: *De la Médecine Opératoire*, in 3 volumes, was one of the first and a model for modern surgical instruction.

as he tried to needle these abscesses obliquely and tried to shift the single tissues through which he needled, no fistula resulted. He repeated this procedure in the same abscess several times, at different intervals, and they healed well. Abernethy held the erroneous opinion that the penetrating air caused the fistulation but this mistake is too unimportant to question the author's right of priority for the needling of cold abscesses.

August Gottlieb Richter operated cancer of the lip so skillfully that the results were satisfying, both functionally and aesthetically. He warned against the development of ectropion after improper operation of lacrimal fistula. In addition to stressing cosmetic views in operations on the female breast, he requested the method of Abernethy for the opening of gravitation abscesses—he opened them obliquely from above to below.

Antonio Scarpa of Venice illustrated the removal of superficial facial tumours with a charming drawing (Fig. 11), distinguished between cancer, scirrhus and certain other tumours of the skin, and he praised himself proudly for the cosmetic result he had after removing these tumours or cystic tumours of the eye-lids: " . . . e dopo l'operazione non rimane sui tegumenti delle palpebre il piu piccolo vestigio delle pregresse malattie e della sofferta operazione. . . . "[20a]

Pierre Joseph Desault of the Hotel Dieu in Paris criticized the cosmetic results of all previous methods for removal of lacrimal glands, especially the one described by Petit and preferred his own one. Desault is well known for the special dressing he originated for the prevention of a deformity after clavicular fracture. But his own pupil Bichat stated that his teacher's method was not always successful.

At the end of the eighteenth and the beginning of the nineteenth century we find a considerable number of well-known surgeons, especially French and English ones, who studied aesthetic problems.

The ideas of De La Faye about surgical operations were almost literally repeated by Alexis Boyer, a pupil of Desault and surgeon of the Charité at Paris. He studied in detail the problem of the

[20a] Translation: There does not remain on the eye-lids any sign of the past disease or any visible scar from the operation.

écartement of incisions and supposed muscle fibers in the skin. He also paid attention to cosmetic treatment of fractures of clavicle and nasal bone. However he contradicted the experience of Dionis, Heister, Pott, Sabatier etc., concerning the opening of abscesses on neck, face and female breast: he waited for their spontaneous open-

Fig. 11.

Antonio Scarpa removed tumours of the face considering cosmetic end-result.

ings as he found scars then less disfiguring than after instrumental opening. He wrote as follows regarding the application of vesicators, moxes etc.: "on ne doit jamais poser la moxa sur les différentes parties du visage dans l'un et l'autre sex ni sur la poitrine chez les femmes, à cause de la difformité des cicatrices."

Jean Dominique Larrey, was also interested in aesthetic problems, especially in suture technique. For wounds of the external ear, he advised that "the cartilages forming the external ear should be

included within the stitches of the suture making the suture more exact and firm."

It is amazing to observe how very far the military surgeons of the seventeenth and eighteenth century considered aesthetic end-results. Later, in the nineteenth century, military surgeons did not seem to care very much about them. This attitude is completely changed during the present World War II, in spite of the large number of emergency cases, the large and very deep injuries due to modern warfare, in spite of injuries caused to civilians as well as to soldiers, in spite of all the new problems and difficulties now arising. For we find a real competition between the surgeons to obtain the best possible cosmetic result, particularly in problematic cases, as for example extensive burns where the definite appearance is always doubtful. Such cases are put directly under the care of specially trained surgeons and nurses and attended in " plastic centers."

Sir Astley Cooper stressed the incision of glandular abscesses of the neck as soon as fluctuation was perceptible, as Suçruta and Dionis had stressed before him: " . . . You should not wait for the skin to assume a livid hue, for then you will never be able to prevent scars. A scar in the neck of a boy is not of much consequence, but in the neck of a female it is quite a different case. In boys the neck is covered by the dress, whereas in females it is generally exposed, and a scar in the part might be the means of the destroying the happiness of the individual whose misfortune it was to have it. Nothing, gentlemen, is so revolting to the mind, or at least the minds of those who possess fine feelings and a refined taste, as the appearance of anything on the female figure which calls to the recollection that the person you behold is tainted by a disease of a scrofulous nature, and therefore it is your duty, if you have any regard for your own reputation and the happiness of others, to prevent the occurrence of scars on the neck. . . ."

Marie François Xavier Bichat, pupil of Desault, studied before Langer the different contractibility of the skin edges in relation to the direction of incisions. His contemporary, Guillaume Dupuytren, chief surgeon of the Hôtel Dieu, observed a more or less evident écartement in connection with the different directions of incisions

without studying it further. He tried to prevent disfiguring scars after severe burns, stressed highest regard for aesthetic factors, especially in facial wounds, nasal bone fracture etc. Like Boyer he did not apply vesicators in young persons avoiding especially the neck and arms of young women and never more than once to the same spot.

We find other interesting views in the writings of Jacques Mathieu Delpech, professor of surgery at Montpellier. He observed that incisions vertical to the direction of the various parts of the body left gaping wound edges while incisions parallel to these directions heal more quickly. He operated on tumours of the cheeks from within. As deformities—frequently associated with functional trouble—can sometimes not be removed, he said: "Cette impossibilité de réparer la perte de certains organes, impose la loi, dans l'exercise des opérations chirurgicales, de ne point sacrifier des parties dont l'intégralité est nécessaire. . . ."

Abraham Colles of Dublin, stated about the opening of abscesses with a lancet: ". . . it leaves a clean little cut, easily healed, whereas if the abscess breaks of itself there will remain an ugly circular opening. . . ." He called attention to deformities of limbs after fractures, when both bones are broken or in positions where there is no second bone which could provide a natural splint for the broken one, or in the typical fracture of the radius, named after him. Care with regard to diagnosis and reduction can never be overstressed.

We will be satisfied with mentioning only the names of the following authors of the beginning of the nineteenth century all of whom have been concerned with aesthetic problems in general surgery, although without making new contributions: Balthasar Anthelme Richerand, Jean Baptiste François Leveille, Philibert Joseph Roux, Jean Nicolas Marjolin, George James Guthrie, Martell Frank, Frederic Carpenter Skey etc.

Moore's aesthetic claims in smallpox vaccinations deserve attention. He believed that the manner of application and the quality of material should be superior so as to avoid evident scars.

Two American authors of this period, John Syng Dorsey of Philadelphia and William Gibson of Baltimore, expressed aesthetic ideas.

These concerned mainly the treatment of facial wounds: that it is "of peculiar importance to make the cicatrix as small and as smooth as possible, to prevent deformity."

Robert Liston, a Scotch surgeon, avoided adherent scars in a visible position: . . . "the position and directions of natural folds of the integument are to be preferred for the opening, with the view of preventing deformity as much as possible."

Alfred Armand Louis Marie Velpeau, Nicolas Gerdy and Eduard Pierre Marie Chassaignac followed the previous authors in all aesthetic surgical ideas especially in those concerning the direction of incision. Chassaignac deserves special attention because he described for the first time (1851) the "suture celluleuse ou sous-cutanée." He used it chiefly to exclude the danger of infection from without through the stitch canals and to prevent the pain of the skin by perforating it with the needle. The aesthetic effect of this new suture is quite evident: no stitch wounds are visible. Nevertheless this type of suture fell in disuse.[21]

In the second half of the nineteenth century France was not rich in aesthetically minded general surgeons, as Passot states. However at the turn of the century, this country became the cradle of the

[21] As the subcutaneous suture appeared later in different textbooks of surgery under different authors' names, it is worthwhile to point out an error, the correction of which was omitted until now except in some few lines of Passot. Chassaignac used a straight needle and formed the stitch turning the wound edges slightly outside as tailors do in their basting suture. His suture was continuous and done with catgut. W. S. Halsted mentioned the "subcuticular" suture Nov. 4, 1889, in a meeting of the John Hopkin's Medical Society (see *John Hopkins Hosp. Bull.*, Vol. 1, Dec. 1889). He used it in inguinal herniotomies for the same aseptic reasons as Chassaignac. He made experimental studies on dogs before applying it clinically. His suture differed from Chassaignac's only because he used round needles, silk and single stitches. Two months later Kendal Franks of Dublin reported in the *Brit. Med. Journal* a new subcuticular suture with aesthetic indications only for the removal of scrophulous glands on the neck. He combined Halsted's round needle with the continuous suture of Chassaignac and he inserted the ends of the catgut through the angles of the wound on both sides. Three years later, the French M. S. Pozzi brought the "suture intra-dermique" as a "novelty" from the Johns Hopkins University to France. He described it in 1894, combining the methods of Halsted and Franks. He used it for purely aesthetic reasons and in the form familiar to us without knowing that this suture had been reported at one of the meetings of the Société de Chirurgie and had been described in the Bulletin, 40 years before, in his own country.

" chirurgie plastique et esthétique," a movement which began with Morestin and led to the French surgeons of today.

Joseph François Malgaigne (1806-1865) operated abscesses of the cheeks from within—like Scultetus—and he put his incisions in the natural folds. He paid attention to the écartement in relation to the

Fig. 12.

Langer's fissure lines.

direction of the incision. In spite of intensive study he did not find any exact rule and he left it to Karl Langer of Vienna to discover the so-called " fissure-lines " (Spaltlinien, Fig. 12) of the skin. We find them more or less modified in almost every textbook of operative surgery. They form the basis for the " normal incisions " of Theodor Kocher. These incisions should not only spare injuries to muscles, vessels and nerves, but give best possible cosmetic results.

William Hargraeve preferred longer incisions to protect the edges from mistreatment through intra-abdominal procedures and to favour primary healing of wounds. The incision should be equally deep in all parts and the so-called "tails" should be avoided. William Fergusson preferred straight incisions, because "the scar left is less observable" and he was most conservative in the surgery of the extremities: "A great thing when by prescience even the tip of a thumb can be saved." He stressed the amputation or exarticulation of fingers in the basal joint and to resect the distal metacarpal end. In this way he obtained a closer contact of the others fingers and concealed the gap. He also recommended an oval-racket-shaped incision as already used by Lister and Syme—thus anticipating the method of Adelmann by more than half a century.

In addition to these surgeons—mostly French and English, the German surgeons exercised some influence at this time. In the first place there was Johann Friedrich Dieffenbach. He frequently spoke of cosmetic end results especially after resection of tumours during his bedside teaching. He also observed the distortion of the mouth after operations of teleangiectasies in the face and he condemned the cauterisation of gross tumours because scars due to this method were much uglier than those resulting from bloody exstirpation with suitable technique. In single stitches he did not pull the knot too tightly because the traction with following ischemia would damage the tissue, the threads would cut through and cause ugly transverse scars.

Max Joseph von Chelius waited for spontaneous opening of breast abscesses. His English translator Flint South criticized this method because of "necessary production of very unsightly scars, which most grievously annoy the patient and her friends and deservedly discredit the reputation of the medical attendant."

Ernst Blasius applied the rules of plastic surgery to wounds after the removal of facial tumours. He employed long pins and small plates of leather to relieve tension at the wound edges, this deserves attention. It means the revival of the middle age "quilled" suture (Zapfennaht) and it anticipated the "ball-suture" (Kugelnaht) of Neubauer by a decade and the "button-suture" of Lister by a

quarter of a century. All these sutures have one purpose: straight scar formation through sufficient relief of tension.

We do not wish to overlook the merits of two American surgeons interested in cosmetic problems: " Samuel David Gross, professor of Jefferson Medical College, and Henry H. Smith, professor at the University of Pennsylvania."

This historical account now ends with the beginning of the modern era which came about with the general application of anaesthetics and asepsis. Looking back over the past, we are struck by the large number of surgeons who repeated views already expressed by others or who had no aesthetic considerations of their own. They therefore merit little or no place in this paper. Many others only corrected old methods or stressed the opposite of what was done by their predecessors.

I did not pass judgment upon the positive value of single methods or manipulations. I did not often mention rights of priority. " There is nothing more futile then these bickerings over priority in science which spring for the most part from a narrow-minded nationalism " said Sigerist. I had only one purpose: to demonstrate that aesthetic ideas always accompanied and influenced surgical science and technique, that they are not the fruit of modern acquisition. Modern progress such as asepsis, X-rays or modern hygiene could improve the results and diminish the dangers of operations, but they did not create the aesthetic mindedness of the surgeon. The conception of aesthetics in surgery comes from ancient times.

I wished to show that most of our own methods for correction and prevention of cosmetic damage in daily operations—incision of abscesses, direction and conduction of incisions, aseptic wound treatment, treatment of fractures, sutures etc.—were already known in the past. And I cannot help thinking when reading of supposedly new discoveries, methods or purposes, of a statement made by Rudolf Virchow: " It is because the history of medicine is so badly neglected that medical science makes little real headway. It goes round in circles, depending again and again upon the same material, bringing but few new ideas out into the light."

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FRANCISCO XAVIER BALMIS AND THE INTRODUCTION OF VACCINATION TO LATIN AMERICA

PART II *

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VI

The introduction of vaccine into Mexico City was the most vital single necessity confronting the Balmis expedition. The capital of New Spain exercised an enormous influence upon the entire stretch of the continent from San Francisco Bay to Panama. That capital was the physical or spiritual home of the entire ruling class, the group which moulded and determined public opinion. It was absolutely essential for the success of the new therapy to establish its desirability in the minds of the Mexican upper class. Hence Balmis made a particularly strong effort in this direction.

For some reason every attempt to perform vaccinations in Mexico City met with remarkable lack of success. Indeed, the amazing reluctance on the part of the inhabitants lends weight to the theory that certain persons in high places, perhaps the Viceroy himself, were engaged in secret sabotage. It will be remembered that in Vera Cruz, despite numerous previous vaccinations at the hands of local authorities, Balmis was unable to find a single individual upon whom to perform the operation. In Mexico City much the same situation presented itself. Some months previously Don Alexandro Garcia Arboleya had been commissioned by the Viceroy himself [45] to propagate vaccine in the suburbs of Coyoacan and Tacuba where he had encountered little difficulty and had performed several hundred operations. The consistent support of the Viceroy in favor of pre-expedi-

* For Part I see this *Bulletin*, 1942, Vol. XI, pp. 543-560.

[45] Arboleya to Viceroy, Mexico, August 19, 1804. *Epid.* X, *Exp.* 12: 42. Arboleya places the date of his appointment as June 8. However, the work was begun even earlier for Balmis pointed out to the Viceroy in his letter of August 24 (*Epid.* X, *Exp.* 7: 96) that vaccinations had been going on since April 8.

tion introduction of vaccine argues a definite policy which manifested itself not only in Mexico City but in Vera Cruz, Yucatan and various other regions. It is very probable that colonial politics and ambitions were involved although there is no concrete documentary evidence bearing on the point. If so, this will not have been the first occasion on which a protagonist of some form of public health improvement met with reverses at the hands of ignorant and selfish political appointees.

Apart from the motivation, however, Balmis found that when he issued a call for volunteers to be vaccinated at a free public clinic on August 19 and 20 not a single soul responded. What occurred at that clinic is most vividly told by Balmis himself: [46]

"Another proof of this (popular resistance) is seen in the fact that no person whatever has presented himself in order to participate in this immense benefaction, . . . the *Alcalde*, commissioned by your Excellency, having to resort to force to obtain 12 children to be vaccinated for the purpose of insuring continuance of the precious vaccine brought from Madrid. . . . On the 19th and 20th of this month I might have lost the fluid . . . had it not been for the zealous *Alcalde*. He dragged in as many as twenty Indian mothers, whose children we finally vaccinated after much persuasion on our part and after loud vociferation and exclaiming that they were not under obligation to anybody. Some admitted that it was right but that they could not pay, and every single one went to the apothecary, demanding an antidote against the venom that had just been introduced into the arm of her child."

One week later, when the current pustules had matured, luck was equally bad. "The indifference and lack of appreciation with which the local inhabitants look upon the valuable English discovery is deplorable. Despite the notice to the public inviting it to receive free of charge the benefaction distributed by the Royal Expedition on the 27th and 28th, only seven persons presented themselves on the first day and none on the second day." [47] Balmis then appealed to the Viceroy to exert general pressure on the population by means of an

[46] Balmis to Viceroy, Mexico, August 24, 1804. *Epid.* X, *Exp.* 7: 97.
[47] Balmis to Viceroy, Mexico, August 29, 1804. *Epid.* X, *Exp.* 7: 110.

edict or proclamation so as to induce the citizens to utilize vaccination. Since the Viceroy, however, took no active steps it is doubtful whether Balmis ever vaccinated any large segment of the urban population. Meanwhile another untoward incident arose to claim the attention of the Director.[48]

In a manner not clear from the records the Viceroy was apprized of the fact that several children in the local foundling or orphan asylum, who had been vaccinated by Balmis, had since become ill with dropsy and several had succumbed to this disease. The inference drawn by enemies of vaccination was that the dropsy had been due to vaccination and that consequently the operation was dangerous to children. The governor immediately ordered a full investigation of the charges to be held at the asylum on the afternoon [49] of August 17. In addition to Balmis, this meeting was attended by Alexandro Arboleya, Antonio Serrano (physician of the institution), José Garcia Jove (head of the Royal Medical Board) and three other eminent practitioners. The unanimous opinion of these medical men was, fortunately, a complete vindication of the new treatment. Balmis, in his report,[50] stated that he had considered the matter thoroughly and that the illness was due to the bad sanitary condition, poor diet and unfavorable physical regimen to which the orphans had been subjected in the asylum. He added " In order that one of the properties which primarily recommend the practice of vaccination, that of improving the delicate and sickly constitution of

[48] The experience of Balmis with popular mistrust and suspicion would excite sympathy on the part of any physician who has ever tried to introduce a new and more or less mysterious therapeutic procedure. Indeed, the reaction of the Indian mothers is not essentially different from that of numerous individuals even today in so-called enlightened and civilized communities. Moreover, it must be remembered—and this will also be appreciated by public health and sanitation officials—that one hundred years ago the most profound antipathy to all governmental agencies and personages existed among the population at large in Mexico. This was quite natural since for generations the Indian and peon classes had been systematically exploited physically and economically. It was at that time beyond their power of comprehension that the government could bring them any benefits without a bitter price attached.

[49] Viceroy to Balmis, Mexico, August 17, 1804. *Epid.* X, *Exp.* 15: 1 and 3. Balmis to Viceroy, August 17. *idem*, 4 and 5.

[50] Balmis to Viceroy, Mexico, August 18, 1804. *Epid.* X, *Exp.* 15: 6-13.

the children, may function properly, nature shows a propensity to expel and cast off any noxious ejecta in appreciable evacuations. An increasing debility ensued in the delicate bodies of the children and in order to strengthen them it is necessary to resort to proper nutrition and a mode of living which will tend to increase their resistance." He then dilated upon the bad surroundings, mentioning particularly the lack of any maternal care, the excessive dampness and poor ventilation of the building, the lack of decent clothing and the "monotonous diet furnished of necessity in these asylums." [51] Don Antonio Serrano in his report, although denying bad conditions in his institution, substantiated Balmis' opinion in effect.[52] He noted that all the afflicted children had been housed on the ground floor which was particularly damp and malodorous. After the survivors had been removed to the more salubrious second floor, most of them recovered. The statements of the remaining physicians followed the same lines as the preceding, affording complete exoneration of vaccine as an agent responsible for the dropsy epidemic.

In view of the dropsy affair, despite its favorable outcome, and in view of general popular indifference, it appeared to Balmis that a strong, consistent policy should be inaugurated and be supported by the full weight of the viceregal authority. Moreover, he was keenly appreciative of the necessity for some administrative continuity which would insure the perpetuation of the vaccine after his

[51] That the condition of this institution at the time was atrocious cannot be doubted. In fact, every medical man who offered a report agreed that such was the case. As a result the general health and vitality of the inmates must have been at such a very low level that the slight extra strain induced by a mild case of smallpox was sufficient to render acute all manner of chronic or sub-acute infections.

The actual symptoms of the so-called dropsy seem to suggest a composite of respiratory diseases, perhaps including influenza and pneumonia. Balmis' description is as follows: " . . . at first manifesting itself in the form of swollen face and feet, very quickly proceeds to affect the stomach, then to the chest, culminating in all the symptoms of sebaceous pneumonia, which impedes the respiration and finally conduces to a state in which the compression of the humors precipitates a true apoplexy of a type that kills quite suddenly on the same day." Antonio Serrano deposed thus: "The ailment begins with symptoms of dejection, loss of appetite, yellowish color, laxness of the extremities . . . then follows the swelling of the feet, then the stomach, respiration is labored, and finally general dropsy supervenes and then death."

[52] Serrano to Viceroy, Mexico, August 19, 1804. *Epid.* X, *Exp.* 15: 14-16.

departure. Consequently, he approached the Viceroy with a plan, embodying various features which he considered desirable in the light of his experience both in the New World and in Spain. This plan was set forth in two lengthy documents, entitled "Means for the Maintenance and Perpetuation of the Precious Vaccine in this, the Capital of Mexico" and "On the Establishment of a Public Vaccination Clinic." We have here a very complete and elaborate exposition of the most highly approved methods for the administration of vaccine which were current in the early nineteenth century. The Balmis Plan—as it may be termed—served as the prototype and model for all similar proposals in the Spanish colonies and was the working basis for public health administrators for many years subsequently. Moreover, it possesses features which are appreciated even today in a world dedicated to "modern" procedures. For these reasons it seems desirable not only to consider the provisions of the plan in some detail, but to set forth the text of the documents in translated form as an appendix (see Appendix II).[88]

In a brief introduction Balmis pointed out that the uncertainties of casual propagation of the vaccine rendered essential some rigid central administration, directly under control of the state. This administration was to be vested in a board consisting of several medical and several non-medical men. The purpose of the latter was to ensure financial and moral support on the part of influential segments of society, for example, the Church.

For the transaction of business, the board needed, according to Balmis, two secretaries, one purely administrative, the other professional. The latter officer was to keep a careful record of all vaccination data. Meetings were to be held twice a month for discussion of all matters pertaining to policy. The members of the board were to serve without pay, as has always been customary with similar charitable or semi-charitable enterprises. Board members were also to assume direct personal charge of all vaccinations held in the city. However, in order to lighten their burden as much as possible Balmis proposed an elaborate system whereby the various members would alternate with one another.

[88] The originals are to be found in *Epid.* X, *Exp.* 7: 121-146.

In Article 6 a permit system was set up whereby only persons licensed by the board were to be allowed to vaccinate. This was an obvious necessity, as was the regulation in Article 7 against inoculation with virulent human smallpox. The board thus was endowed with the function of policing the country with respect to malpractice of all kinds.

Articles 9, 10 and 11 dealt with new investigations and discoveries. Through a group of "corresponding members" in the provinces a thorough attempt was to be made to discover and utilize cow pox and thus relieve the strain on the perpetual series of human carriers, who were otherwise necessary. Balmis also wished to cultivate the study and investigation of vaccine with reference to its powers for healing other diseases. He may have seriously held the opinion that vaccination would relieve plague, yellow fever, and elephantiasis—as he stated in Article 10—although such optimism seems extreme even in view of the limited knowledge of these diseases in the early nineteenth century. On the other hand, he may have wished merely to advertise vaccination, as others have done in similar circumstances, even at the risk of overstatement, although in the light of his entire career, it is probably most reasonable to assume that he was somewhat carried away by the success of the method with smallpox and believed that other maladies might be treated to advantage by the same method. Regardless of certain absurdities, however, his insistence upon the research function of the vaccination board stamps him as a man of unusual scientific vision and as a clinician with an appreciation of pure science far in advance of his profession in the New World.

The second part of the document undertook to set up a public clinic for the purpose of vaccination. This clinic was to differ from others of its type only in being under the direct supervision of the all-powerful board. The feature of free treatment was nothing new either in America or in Europe, nor were the provisions whereby the recipients of vaccine at one session were to provide fluid for the next group. Perhaps the most significant portions of the regulations—and certainly the most sensational—were those contained in the preamble which related to general conditions in Mexico. Balmis was very emphatic in his strictures against the ordinary hospitals,

which institutions he definitely did not want to be used to house any clinics. He attributes much of the public reluctance to be vaccinated to the "dislike and abhorrence with which these institutions are commonly regarded," and the "filth and emaciation of the inmates." Unfortunately, his low opinion of hospitals, which was probably entirely justified, extended itself to become a rather bitter intolerance of the very people whom he sought to serve. His difficulties with popular mistrust and suspicions led him to speak with considerable asperity of America, and its inhabitants, whom he compared highly unfavorably with those of Europe. Perhaps these remarks were true, but they were undiplomatic. They were, however, characteristic of the man—sincere, able, devoted to medical progress, but hasty, ill-tempered and completely impatient with the slightest opposition.

After the receipt of Balmis' proposals, the Viceroy submitted them, together with various other plans, to Juan José Güereña, parish priest of San Miguel and a member of the governing board of the city poor house.[54] In response to the Viceroy's request, Güereña offered the opinion that of those submitted the scheme of Balmis was the best, but he suggested certain modifications in detail,[55] principally involving administration. This report, however, was not sent to the Viceroy until August 26, 1806, two years after Balmis was in Mexico. In the meantime no action had been taken. The documents were then submitted to the *Fiscal de lo Civil* for an opinion.[56] This official replied on January 31, 1807, generally endorsing the Balmis plan but also favoring the changes suggested by Güereña.

Now the essence of these alternations was that the Board of Vaccination be made up primarily of persons already members of the Board of Charity which controlled the municipal mendicant asylum,

[54] Viceroy to Güereña, Mexico, August 16, 1804. *Epid.* X, *Exp.* 7: 154.

[55] Güereña to Viceroy, Mexico, August 26, 1806. *Epid.* X, *Exp.* 7: 156-162. Also the *Fiscal* to the Viceroy, Mexico, January 31, 1807. *Epid.* X, *Exp.* 7: 163-194.

[56] Two of the principal officers of the colonial government were the *Fiscal de lo Civil* and the *Fiscal de lo Criminal*, corresponding perhaps to our attorney general, save that one was concerned with civil matters and the other with criminal. As a rule the Viceroy secured the opinion of the appropriate *Fiscal* on all matters of policy.

and that the clinic be held at that asylum instead of at a separate house as Balmis had wished. This proposal, therefore, vitiated if it did not nullify completely the independent status which Balmis regarded as essential to the efficient operation of the Board, since it threw all control into the hands of the local political group who already were in power. In other words, the Fiscal managed very effectively to kill the spirit of the Balmis enterprise, while conserving much of the form. In conformity with the advice of his lieutenant, the Viceroy ordered the creation of a new department in the Royal Asylum to conserve and propagate vaccine " in accordance with the pious intentions of his Majesty." [87] Thus were buried, in true bureaucratic fashion, the excellent ideas of Balmis. As far as any available records indicate, no further attempt was made to resurrect them. No central board of vaccination was ever formed, and if the new department at the mendicant asylum was ever functional, it has left no trace of its activities.

VII

Since the primary purpose of the Royal Expedition was to introduce vaccination to the inhabitants of the territories visited, it was necessary for the Director or selected assistants to make personal contact with the officials and leading citizens of as many towns as possible. Mere regulations and orders promulgated by the viceregal government or even the clerical hierarchy were likely to be received with indifference. Haphazard introduction depending upon local initiative or the exigency of epidemics likewise would be too uncertain and risky. To depend upon the nearly non-existent national medical profession or the caprice of municipal politicians was manifestly out of the question since the former were too ignorant and the latter too selfish and corrupt to ensure proper handling of the treatment. For these reasons it was desirable for competent and disinterested persons to go as emissaries or missionaries and make the people themselves acquainted with the procedure and merits of vaccination.

To this end a number of subsidiary or secondary expeditions went

[87] Viceroy to the *Junta de Caridad*, Mexico, June 7, 1807. *Epid.* X, *Exp.* 7: 190.

out from Mexico City during the winter of 1804-1805. During their course nearly every sizable community in central and southern Mexico was systematically covered. (Vera Cruz and Yucatan had already been visited.) The course of action of the propagandist and the problems confronting him were of the same general sort everywhere: popular distrust, ambitious or hostile officials, and difficulty in securing adequate carriers. It would not be particularly enlightening and undoubtedly would be tiresomely repetitious to set forth to the limit of documentary detail every move and action of these apostles of vaccination. Consequently this account is limited to a statement of 1) the places visited, for the wide extent of introduction is significant ; 2) the number vaccinated, that is, the relative success of the venture; and 3) any local incidents or problems which are of interest in themselves or which illuminate conditions pertaining to public health at the time. Moreover, it appears simpler and more lucid to arrange this material according to locality rather than attempt to preserve the exact time sequence of the minor expeditions.

Puebla. Leaving Mexico City on September 18, Balmis reached Puebla two or three days later. His reception was unusually cordial and in marked contrast to his previous experiences. On arrival he was conducted to the city hall where he was greeted by the Bishop of Puebla, the Governor (Conde de la Cadena), the chief officials of the municipality and many other dignitaries. The governor then took Balmis and the vaccinated child carrier who had accompanied him into his coach and personally conducted them to the cathedral where High Mass was said in honor of the expedition. Subsequently the members were conducted to the houses prepared for them.[58]

Vaccinations began immediately and in prodigious numbers. Whereas in three weeks in Mexico City Balmis had found at most one or two hundred converts to the treatment, in Puebla people flocked in literally by the thousand. In one month, on October 20, the number had amounted[59] to 11,180 and by December 14 to

[58] Conde de la Cadena to Viceroy, Puebla, Oct. 19, 1804, *Epid.* IV, *Exp.* 3: 34.

[59] Dr. José Ignacio de Beravueta to Viceroy, Puebla, Oct. 20, 1804. *Epid.* IV, *Exp.* 3: 26, and Conde de la Cadena to Viceroy, Puebla, Dec. 15, 1804, *idem*, 58.

11,996. During early October, the daily rate was over five hundred. If the figures reported represent anywhere near a true estimate the entire population of the city must have been rendered immune by the end of the year.[60] Such an effective series of vaccinations can have been due only to vigorous cooperation on the part of the municipal rulers, and indeed one must admire the outstanding and enlightened interest shown by these individuals.

In addition to supporting the introduction of vaccination, the municipality took immediate steps to organize a vaccination board. This body, known as the *Junta Central Filantropica de Puebla*, with the Bishop, the Governor, Balmis and several prominent citizens as members, had a long and honorable career and was instrumental in promoting the public welfare in Puebla for many years. It, therefore, deserves more than cursory mention, but since its history does not concern the actual smallpox expedition, any extended account of its activities is best deferred at present.

Tehuacan. After his return to Mexico City, Balmis decided to make a trip to the north and west. Meanwhile it seemed desirable to send vaccine to the regions south of the city to the province of Oaxaca. Since neither Balmis nor any of his assistants would be available, the Viceroy decided to send Dr. Alejandro Garcia Arboleya, a member of the *Protomedicato* and a prominent physician at the capital.[61] Accordingly Arboleya set forth on or about October 1, taking with him 3 boys as carriers,[62] and, having passed through Puebla, reached Tehuacan on the 5th. There he was very well received and feted in pursuance of the inevitable custom. Although the plan had been to proceed without stop toward Oaxaca, he was obliged to remain a day and satisfy public demand by vaccinating 180 persons.[63]

[60] Puebla at the time had a population of little more than 50,000. Of these the great majority had suffered from smallpox in the epidemics of 1779 and 1797, leaving simply those few who had escaped plus children and newcomers.

[61] Viceroy to *Superintendente de Proprios y Arbitrios*, Mexico, September 21, 1804. *Epid.* IV, *Exp.* 14: 37.

[62] Arboleya to Viceroy, Teotitlan del Camino, October 10, 1804. *Epid.* IV, *Exp.* 6: 21.

[63] This effort did not satisfy the inhabitants, however, for two months later a parish priest in Tehuacan wrote the Viceroy (*Epid.* IV, *Exp.* 6: 60) on December

Oaxaca. Continuing his journey directly, Arboleya arrived at the ancient city of Oaxaca, on October 15, and immediately proceeded to vaccinate.[64] Realizing that the inhabitants were averse to any new medical ideas, the *Corregidor*, Antonio Maria Izquierdo, offered one of his own children as the first subject. Other prominent citizens followed his example and 187 were vaccinated during the first three days. By November 6 the number [65] had risen to 541. Meanwhile work had gone ahead with the organization of a vaccination board. Plans were completed and the formal establishment was ratified by the *Ayuntamiento* on the tenth of November.[66] A few days later Arboleya, his task completed, set forth on his return journey, leaving behind a very good impression. In fact, so highly was Arboleya regarded by the citizens of Oaxaca that they took the unprecedented action, not only of thanking him in the warmest terms, but also of offering him a gratuity of one thousand pesos as a token of their esteem. He declined the gift, with the comment that he was interested only in the welfare of humanity and not in financial gain, a gesture which in turn increased the prestige of the vaccination cause in the south.[67]

The Mixteca. So enthusiastic were the leading citizens of Oaxaca concerning the new treatment that shortly after the departure of Arboleya, the recently formed vaccination board decided on its own account to send a mission to the Mixteca. This region, which comprises the western and northwestern part of the present state of Oaxaca was at that time a wild, primitive expanse of hill country inhabited by natives of almost pure Indian stock. To send a vaccination expedition into this territory was completely at variance with the usual policy which contemplated proselyting only in the centers

27 that not more than 200 had been vaccinated. The clergyman asked that a certain José Mariano Castro be appointed resident in charge of vaccination.

[64] Antonia Maria Izquierdo to Viceroy, Oaxaca, October 19, 1804. *Epid.* IV, *Exp.* 6. 43.

[65] Arboleya to Viceroy, Oaxaca, November 6, 1804. *Epid.* IV, *Exp.* 6: 63.

[66] Minutes of the *Ayuntamiento*, Oaxaca, November 20, 1804. *Epid.* IV, *Exp.* 6: 89-96.

[67] Izquierdo to Arboleya, Oaxaca, November 20, 1804. *Epid.* IV, *Exp.* 6: 97; Arboleya to Izquierdo, November 14, *idem*, 98. Izquierdo to Viceroy, Oaxaca, November 20, *idem*, 100; Viceroy to *Indendente* of Oaxaca, December 22, *idem*, 105.

of civilization such as the larger towns and cities. Nevertheless it demonstrated on the part of the Oaxaca Board a real appreciation of the national needs, for the great majority of Mexicans, then as now, lived on the land. Moreover, as far as I am aware, it was the only attempt made at the time to bring vaccination to the poorer rural communities.

On November 26 the board commissioned Santiago Coda Azufano [68] to undertake the work, and allotted him the tremendous sum of three pesos a day of expenses. But the board, however noble its intentions, did not itself possess a single peso, nor were the municipal charitable funds in a much better position. The difficulty was resolved by one of the city officials who generously offered to defray the necessary expenses from his own pocket " so as not to delay the departure."

Coda started on November 29, or at least he started drawing his expense account on that date, and returned on January 3, 1806, more than a year later.[69] Of the details of this trip we know absolutely nothing, except that when the directors of the board examined Coda's lists they found the incredible total of 16,983 Indians vaccinated. Speaking as one who has visited this remote region and has seen the inhabitants, the writer must pay tribute to the magnificent feat performed by this obscure practitioner—provided his record is authentic. For to travel by muleback over obscure mountain trails, deal with a tough, unenlightened and probably hostile population and at the same time perform some 300 vaccinations each day for a year is a task of sufficient magnitude to tax the resources and ingenuity of a genius.[70]

Valladolid. After his excursion to Puebla Balmis undertook a more ambitious tour in order to cover the provinces to the west and

[68] Izquierdo to Viceroy, Oaxaca, January 11, 1805. *Epid.* IV, *Exp.* 6: 106.

[69] Minutes of meeting of vaccination board, Oaxaca, January 14, 1806. *Epid.* IV, *Exp.* 6: 121.

[70] It is quite possible that further details might be found in the minutes and correspondence of the Oaxaca vaccination board if such still exist. A search of the municipal archives at Oaxaca might repay an investigator in information concerning this adventure in medical missionization. There must always be regret that the story of some of the most interesting and significant exploits in public health can never be accorded the recognition they deserve.

north of Mexico City. His first stopping place was Queretaro from which point he was unable to proceed personally. To Valladolid (modern Morelia in Michoacan) he assigned Gutierrez. This gentleman arrived in early November and was received with the customary ceremonies. Under his direction 205 vaccinations were performed and local physicians instructed in the technique. Subsequently the latter persons carried on with considerable success, since by January 18, 1805 the total operations [71] amounted to 1,236. It is noteworthy also that true cowpox was discovered by Gutierrez in an animal on the *plaza* of the town. This marked the second discovery of cowpox in Mexico, for Balmis had found it near Puebla in October. However, there is no record of it ever having been employed to supply fresh vaccine.

Queretaro. In early November, Balmis spent a few days in Queretaro where he issued the usual instructions and vaccinated 200 persons.[72] Whether or not the townspeople continued the work subsequent to his departure is not apparent from the records.

Celaya. Passing through this town on the way from Queretaro to Guanajuato, he spent a day and in the course of one hour vaccinated 160 persons in the presence of the practitioner's and the Ayuntamiento.[73]

Guanajuato. Here the usual procedure was followed but apparently no events of particular interest occurred. The number of vaccinations is not reported, although the fluid was extant in the city as late as the following May.[74]

[71] Felipe Diaz de Horzegg to Viceroy, Valladolid, January 18, 1805. *Epid.* IV, *Exp.* 5: 7.

[72] Balmis to Corregidor of Queretaro, Queretaro, November 14, 1804. *Epid.* IV, *Exp.* 2: 26; Balmis to Viceroy, Celaya, November 16, 1804. *Epid.* IV, *Exp.* 13: 20.

[73] Balmis to Viceroy, Celaya, November 16, 1804. *Epid.* IV, *Exp.* 13: 20.

[74] Juan Antonio del Riano to Viceroy, Guanajuato, May 3, 1805. *Epid.* IV, *Exp.* 5: 47. The emphasis laid by a paternalistic government on correct legal form and procedure is illustrated by a small incident from Guanajuato. Back in May, 1804, the *Intendente* of Guanajuato wrote the Viceroy (*Epid.* IV, *Exp.* 4: 1) that a certain citizen of the town, Don Sebastian de Sorondo, had sent to Dr. Perez of Vera Cruz and secured some preserved vaccine with which he had inoculated his two sons. Don Sebastian was thereupon charged with a misdemeanor, to which he replied that he had been motivated solely by paternal affection and solicitude. The

Guadalajara. From Valladolid the assistant Gutierrez proceeded to Guadalajara, where he remained from December 7 to December 24. His visit in the western city was not a particularly happy one [75] chiefly on account of a controversy concerning finances. According to the Royal Decree of 1803 and also further instructions sent out from Madrid directly to the *Audiencia* or regional governing body, the imperial treasury was liable for expenses incurred by the expedition. Normally all such expenses would fall on the funds of the *Audiencia*, which represented the king in western and northwestern Mexico. However, the regent of this body stated categorically that there was insufficient money, and called on the local *Ayuntamiento* of the city for help. The latter, after considerable discussion, averred that although there were only 2,000 pesos in the city treasury, it would guarantee 500 pesos—a fairly generous offer considering the poverty of the town. At or about this time Gutierrez arrived and was cared for liberally, for he was supplied with a house, furnishings and other articles necessary for his work. Presumably he went ahead with the introduction of vaccination in the usual manner, although, strangely enough, apart from mention of a public celebration and special Mass in his honor, the records contain no reference to his medical activities or the progress of the actual vaccinations.

The principal difficulty, however, arose in connection with a rather unusual matter, not with the ordinary routine. Balmis had assigned Gutierrez the commission of securing six children, between the ages of three and five, to be used as carriers for the forthcoming trip to

Viceroy replied (*Epid.* IV, *Exp.* 4: 3) with a reprimand in which he stated that no vaccinations should be performed by private individuals and required the *Intendente* to advise Don Sebastian that his conduct involved the assumption of reprehensible liberties.

[75] Two sizable *expedientes* are devoted to the Guadalajara correspondence (*Epid.* IV, *Expedientes* 7 and 8). *Expediente* No. 8 contains a considerable number of documents which concern instructions issued to the Royal *Audiencia* of Guadalajara relative to the expedition. There is also some material relative to the financial difficulties of the *Audiencia* and the municipal *Ayuntamiento*. *Expediente* No. 7 deals with the controversy with Gutierrez over payment of expenses. It does not appear worthwhile to set forth these letters in detail. The principal points are discussed briefly in the text, but without many specific citations of documents. It is to be understood that the sources of all statements pertaining to Guadalajara are the files mentioned above.

the Philippine Islands. The king in his original instructions, it will be remembered, had stated that the compensation to the children and their parents for such service was their ultimate care and education. But evidently at some subsequent time another alternative was offered. This consisted, if the parents so elected, of the flat payment of 100-150 pesos to the family with no obligation respecting the future care of the child. When Gutierrez undertook to find the six boys in Guadalajara he found all parents preferred ready cash to future benefits. He therefore contracted obligations in the sum of 900 pesos. In addition, he bought clothing, bedding, saddles and other equipment for the six boys, making a total outlay of 1,478 pesos which was to be charged to the Royal Exchequer. This was all listed as extraordinary expense, not routine cost of the expedition. Having contracted for this sum, Gutierrez calmly sent in the bill to the *Audiencia*. The latter august body, having already foisted the routine cost onto the municipality, was exceedingly perturbed and flatly refused to pay the bill. They held the outfitting of vaccine carriers for the Philippine trip fell outside the category of unusual and incidental expenses for which the Royal Orders held them liable, since it was for the benefit of a totally different part of the Empire. Gutierrez therefore had acted entirely beyond the limits of his authority in contracting such obligations and, moreover, the *Audiencia* did not have the money anyway. After a lengthy and quite vituperative discussion, the *Audiencia* forwarded their decision to the Viceroy. The argument was not closed until January, 1805, at which time Gutierrez had long since departed with the six boys. Meanwhile the creditors were demanding payment and the parents were wondering whence would come the promised compensation.

The final outcome is not clear, save that much bad feeling was engendered. According to a letter from Gutierrez to Balmis on January 1, the major part of the disputed expenses were paid by the Bishop of Guadalajara, who seemed to have an inexhaustible pocketbook [76] and, quoting Gutierrez, "to whom Your Grace, as Director

[76] Balmis to Jimenez, Mexico, January 12, 1805. *Epid.* IV, *Exp.* 7: 25. It may be noted that the Bishopric of Guadalajara was at that epoch the prime mover and support of many charitable enterprises. It was the Church which pulled the province of Jalisco through the terrible "año de hambre" in 1786-1787, and which was responsible for financing most subsequent enterprises in public health.

of the Expedition should extend thanks for all he has contributed to the great service of the king and the good of mankind, temporal and spiritual." On the other hand the secretary of the *Audiencia* later stated that he did not know whether the benefactor had been the Bishop or the Regent of the *Audiencia*.[77] Of the two it is more likely that the Bishop contributed the money.

Balmis, as director of the entire project, was much irritated when he heard of the controversy, for he realized that such unfortunate affairs very easily could jeopardize the success of his enterprise in a large section of Mexico. He could do no more, however, than to send the *Audiencia* his regrets and to disavow the impetuosity and "excessive zeal" of his assistant. It is to be noted, however, that he took the six boys with him to the Philippines.

San Luis Potosí. His commission in Guadalajara completed, Gutierrez returned to Queretaro where he found orders from Balmis ordering him to go to San Luis Potosí.[78] Having made the necessary arrangements for transportation, he immediately proceeded to his destination. There he found, as so often had occurred before, that the vaccine virus had reached the city a long time previously. In July of 1804 Dr. Pedro Puglia, a physician of Mexico City, had sent several vials of vaccine to Don Cristobal Corvalán. The latter had then vaccinated four children, or had caused it to be done by Dr. Barrenechea, according to which of two accounts is to be credited as accurate.[79] Regardless of this early attempt, however, the city extended a warm welcome to Gutierrez, who during his sojourn was able to vaccinate 391 persons.[80]

[77] José de Salinas to Jimenez, Guadalajara, March 23, 1805. *Epid.* IV, *Exp.* 7: 30.

[78] Gutierrez to Dominguez, Queretaro, January 1, 1805. *Epid.* IV, *Exp.* 2: 37.

[79] Corvalán to Viceroy, San Luis Potosí, July 14, 1804. *Epid.* IV, *Exp.* 9: 10; also *Ayuntamiento* to Viceroy, San Luis Potosí, July 21, 1804, *idem*, 6.

[80] José Ignacio Velez to Viceroy, San Luis Potosí, January 9, 1805. *Epid.* IV, *Exp.* 9: 21. There exists a letter, dated July 16, 1806, from the Viceroy to the subdelegates and other authorities of the province of San Luis Potosí (*Epid.* IV, *Exp.* 9: 24) which tells of a projected expedition by Dr. Don Alejandro Arboleya. This practitioner was "commissioned to extend and make vaccination permanent," in that region. No other information is at hand concerning any such expedition. Nevertheless this letter is suggestive as indicating efforts to continue the work of Balmis more than a year after his departure from Mexico.

Zacatecas. This city was visited by Balmis, following upon his call at Guanajuato. Although he arrived on Friday, November 30 and departed Monday, December 3, his stay was characterised by great activity. In addition to the usual religious ceremonies, banquets and social functions he set up a clinic and vaccinated 1076 persons in two days. In addition, he supervised the establishment of a permanent central board of which he became an honorary member. On Monday, he departed for towns to the north, taking with him two child carriers who had been vaccinated and had been presented to him by the people of Zacatecas. On this final leg of his journey he visited Fresnillo, Sombrerete and Durango to all of which towns he donated vaccine.[81] Returning on the 15th Balmis rested for three days before setting out on the trip back to Mexico City. After his final departure the Zacatecans kept up the work for a considerable period. The Central Board continued to function actively, at least until early 1806. There being no physician in the province, a phlebotomist was entrusted with the clinic.[82] All these efforts resulted in a total of 1,650 vaccinated by February 17, 1805, and 2,448 by January, 1806.

Toluca. This city was visited in March, 1805 (after Balmis had sailed for the Philippines) by Don José Ignacio Garcés, a surgeon approved by the Royal Medical Board. Having secured vaccine in Tenancingo, he used it in Toluca, to vaccinate 80 children.[83] For this he was commended by the Viceroy and given permission to practice the treatment generally in the district.

[81] Report, Zacatecas. *Epid.* IX, *Exp.* 4: 10-56. It should be noted that Durango represented the northernmost point reached by the Balmis expedition.

[82] *Junta Central* to Viceroy, Zacatecas, January, 1806. *Epid.* IX, *Exp.* 4: 65. The utter dearth of medical practitioners in the provinces was quite characteristic of Mexico in the early nineteenth century. It is quite probable that outside of a few large cities such as Mexico City, Puebla, Vera Cruz and Guadalajara there were no accredited physicians whatever. Hence health problems had to be taken care of by semi-professional persons such as phlebotomists, barbers, practical nurses, midwives, etc. Although the situation is somewhat better today, nevertheless the great concentration of doctors in the large urban centers and their strong disinclination to practise in the rural districts constitutes one of the most serious problems confronting modern Mexican medicine. Great credit is due the recent administration of Lázaro Cardenas for its consistent effort to bring a well-trained personnel to even the most remote sections of the Republic.

[83] Garcés to Viceroy, Toluca, March, 1805, *Epid.* IV, *Exp.* 1: 35.

Tenancingo. This small town of perhaps 10,000 inhabitants, situated about fifty miles southwest of Mexico City, was fortunate in being governed by an active and progressive local administrator (*subdelegado*), Don Antonio de Elias Saenz. This functionary, on receipt of the usual official announcements, wrote to the Viceroy [84] asking for vaccine, inviting Balmis to come in person to Tenancingo, and offering to defray all expenses from his personal funds. In response to this request, Balmis sent two carriers, although apparently he was not able to go himself. By December 22, Elias reported that he had vaccinated 1,076 individuals in Tenancingo and the neighboring parishes of Tecualoya and Zumpanquacan.[85] According to his communication, smallpox had practically disappeared in the district. Since no physician is mentioned it is entirely probable that Elias actually performed the vaccinations himself, no small task for an amateur. This view is supported by the fact that on December 25, Don José Maria Victorino Cervantes, a surgeon accredited by the Royal Medical Board, applied to Elias for the exclusive right to perform vaccinations in his jurisdiction. Apparently Elias was glad to secure the services of a qualified man for he immediately accepted the offer of Cervantes.[86] Thus the work continued for more than year and a total of 2,493 vaccinations had been performed in Tenancingo.[87]

Chilpancingo and *Tixtla.* Passing through these towns on his way to Acapulco for embarkation, Balmis paused long enough to introduce vaccination. Few details are available save that he performed 65 operations and instructed two individuals in Tixtla.[88] Presumably, although there is no specific reference to the point, he also introduced the treatment in Acapulco while waiting for the ship to depart.

Other towns. Certain small towns are given casual reference in the official documents. On his trip north Balmis " propagated and

[84] Elias to Viceroy, Tenancingo, October 19, 1804, *Epid.* IV, *Exp.* 1 : 3.

[85] Elias to Viceroy, Tenancingo, December 22, 1804, *Epid.* IV, *Exp.* 1 : 20.

[86] Cervantes to Elias, Mexico, December 25, 1804. *Epid.* IV, *Exp.* 1 : 23; Elias to Cervantes, December 28, 1804, *idem,* 25.

[87] Elias to Viceroy, Tenancingo, January 11, 1806. *Epid.* IV, *Exp.* 1 : 44.

[88] Cassal to Viceroy, Tixtla, January 30, 1805. *Epid.* IV, *Exp.* 13 : 67.

instructed" not only in the cities already mentioned but also in Villa de Leon, Lagos, and Aguascalientes. The *subdelegado* of Acambaro sent a barber and two boys to Celaya for the purpose of introducing vaccine in his municipality,[89] but unfortunately so many residents opposed the treatment that the virus soon died out. At Salvatierra, likewise, nothing was accomplished because of popular opposition. Indeed, even before the expedition came anywhere near the town, the people were hiding their children or fleeing with them to the hills.[90]

Before ending this account of the activities in which the expedition participated in Mexico, it will be desirable to summarize briefly the work accomplished. In the space of approximately six months the director, or his assistants, visited every important city, and many of the small towns of Mexico. The medical profession was given such complete training in the practise of the new method that numerous persons remained after the departure of Balmis who were qualified to continue the work. At all key points an adequate supply existed both of preserved vaccine and of living carriers. The administration of smallpox prevention was vested in a series of local vaccination boards which in turn were under the direct authority of the colonial government. A system of free public clinics was established. Finally, a great many thousand inhabitants were actually vaccinated and, perhaps more important, caused to lose their initial fear and suspicion of the strange procedure.

Concerning the actual number of vaccinations performed from July, 1804 to January, 1806, we have only the scattered estimates cited previously. From these data it is evident that the numbers varied enormously from district to district. Moreover, it is probable that many vaccinations were never recorded officially. If a specific figure were demanded I should be inclined to feel that 100,000 might not be an overestimate. This would represent roughly two per cent of the entire population. If this is regarded as, after all a rather insignificant total, it should be remembered that not only were large sections of the country skipped by the expedition (such as Sinaloa,

[89] Duarte to the *Intendente, Acambaro,* March 22, 1805. *Epid.* IV, *Exp.* 15: 66.

[90] Gonzalez de Cassio to the *Intendente,* Salvatierra, March 23, 1805. *Epid.* IV, *Exp.* 15: 70.

Sonora, Chihuahua, Coahuila, Tamaulipas and Nuevo Leon) but also vaccinations were confined to children. This was due to the fact that in 1804 practically every individual over twenty had already been exposed to smallpox in the sweeping epidemics of 1779 and 1797. If we make the fairly safe assumptions that the expedition reached only half the population by area and that only 20 per cent of the inhabitants were non-immune, then we may conclude that Balmis and his helpers reached twenty per cent of those who might have benefited by their ministrations. Such a record on the part of an introductory and propagandising expedition by strangers rather than on the part of a long-term public health program sponsored by the local government represents a real achievement. The lasting value of the Balmis expedition in Mexico is seen not only in its contemporary accomplishments, but also in the attitude of the Mexican people toward vaccination even today. Despite a lapse of decades, since 1810, during which vaccination was practised not at all or at best sporadically, and even then only in the centers of culture, it is at present accepted as desirable and useful by the general population. The great efforts of the Cardenas administration have nowhere been rewarded with greater success than in vaccination. In the past few years literally entire states have been vaccinated *en masse* with extremely little antagonism on the part of the people. In many primitive rural districts where even the elements of modern sanitation and preventive medicine are unknown, the natives recognize the significance and value of vaccination. Naturally this relative open-mindedness with respect to the treatment cannot be ascribed wholly, or perhaps in great part, to the events of 1804-1805. Nevertheless it cannot be doubted that the foundation was laid at that time. The entire incident, moreover, demonstrates very beautifully the thesis that even a backward and ignorant population can be induced to accept a beneficent, even though mystifying, new type of therapy, provided a comprehensive, sincere, and well-organized attempt is made to introduce it.

IX

Let us return now to the fortunes of Francisco Xavier Balmis himself. The Director, having accomplished his purpose in the New

World, began to consider the next step ordered by the King, that is, the journey to the Philippines. As a matter of fact this voyage was constantly in his mind from the time of his first arrival in Mexico, and indeed one obtains the impression from his letters that he regarded Mexico not as a destination but merely as a way station on the route to the Orient and thence around the world. This attitude, rather openly manifested, met with little sympathy from the Viceroy, who was interested only in Mexico, and who did not hesitate to put obstacles in the path of Balmis' desire.

The matter was first discussed by Balmis shortly after his arrival in Mexico. In a letter to the Viceroy from Vera Cruz [91] on July 25, 1804, he stated his decision to hurry immediately to the capital and turn over the 22 boy carriers so that he might be free to prepare for his departure to Acapulco and the Islands. The Viceroy replied [92] that "Relieved of your burden, as requested in your letter, you are now free to propagate vaccination in the capital of the viceroyalty." In other words, attention should be given to the immediate problem of Mexico, not to voyages to distant parts of the Empire. Regarding the Philippine trip, he stated that the vessel now in Acapulco could not carry the expedition because it was already filled up. It was necessary that certain troops be embarked as also a group of missionaries whose presence was sorely needed in the Islands. Balmis would have to wait till the next ship.

Although the policy of the Viceroy seems very reasonable, nevertheless Balmis was highly exasperated. He wrote a very polite letter of acquiescence to the Viceroy [93] but it is clear that he did so with very bad grace. Indeed, his feelings led him to express himself in a stronger appeal than perhaps was customary in addressing the head of the state: "This (the postponement) has caused me the greatest surprise, because I am intimately conversant with the wishes of His Majesty that the precious discovery should be conveyed, flying if it were possible, to those, his beloved vassals (in the Islands) sparing no expense or exertion. I felt that your Excellency would not relegate to the last place an expedition which, aside from the vehement

[91] *Epid.* X, *Exp.* 7: 72.
[92] Viceroy to Balmis, Mexico, August 14, 1804. *Epid.* X, *Exp.* 7: 85.
[93] Balmis to Viceroy, Mexico, August 24, 1804. *Epid.* X, *Exp.* 7: 92.

desire of His Majesty that it fly to those Islands, suffices in itself as a recommendation. For there must be considered the good which it dispenses and the harm which may befall those happy isles if this benefaction were retarded not merely an hour, a week, a month, but possibly a year, as may presently occur. . . . It would prove inconsolable to His Majesty if a smallpox epidemic should break out in the interim and destroy the population of five millions."

In spite of this appeal, the Viceroy was unshaken in his decision and Balmis reconciled himself to the inevitable and stated his willingness to visit the Mexican cities "to the extent that his time before embarking would permit." [94] Meanwhile "I entreat you to keep this matter in mind so that everything may be ready, and in order to fulfill the commission, I must know at least two months in advance." Plenty of time was given him for he was notified sometimes in September or October that the next ship would sail some time in the following January.

Despite the quite fair compromise on a five or six months stay in Mexico, Balmis continued to fret about the Philippines, and the Viceroy continued to raise objections. On October 26 the Viceroy wrote Balmis [95] to "make arrangements with the commander of the vessel in accordance with instructions." This Balmis proceeded to do, writing Angel Crespo, captain of the ship *Magellanes*, and ordering cabins, special food, etc. Crespo replied that he would be delighted to accede to such requests when and if he received direct authorization from the Viceroy.[96] Meanwhile the Viceroy raised the question whether vaccination had not already been introduced in the Islands. If such were the case, then the Royal Exchequer need not be called upon to pay the cost of transporting Balmis and his party. However, the comandante of San Blas reported [97] that the Manila galleon had already departed and hence the information could not be secured.

[94] Balmis to Viceroy, Mexico, September 6, 1804. *Epid.* X, *Exp.* 7:147.

[95] Quoted by Balmis in his letter to Crespo on October 29, 1804. *Epid.* IV, *Exp.* 13:4.

[96] Crespo to Balmis, Mexico, October 29, 1804. *Epid.* IV, *Exp.* 13:6.

[97] Virero y Escaño to Viceroy, San Blas, January 10, 1805. *Epid.* IV, *Exp.* 13:29.

At last, on January 10, 1805 the Viceroy notified Balmis [98] that he had dispatched the requisite orders and that the expedition might proceed. This was followed several days later by an official communication [99] addressed to the Captain General of the Philippines, commending the Balmis party to his consideration. After considerable red tape had been disentangled, Balmis left Mexico City on January 17 and arrived at Acapulco on January 27. He had with him as assistant Antonio Gutierrez, as practitioner, Francisco Pastor and as nurses, Pedro Ortega, Antonio Pastor, Isabel Cendala, and Angel Crespo.[100] In addition were 26 children who were to act as carriers on the long voyage. On or about the first of February the expedition sailed from the shores of Mexico on the ship *Magellanes*.

The subsequent activities of the expedition can be rapidly told. After a rather brief sojourn in Manila where the vaccine was propagated, Balmis separated from his expedition. Leaving Gutierrez as acting director he proceeded at the end of August to Macao.[101] Gutierrez as soon as possible returned to Mexico with the remaining assistants and the 26 children.[102] The latter were returned to their homes. Balmis meanwhile went from Macao to Canton whence he departed finally, to arrive in 1807 at Lisbon and Madrid.

X

The aftermath of the expedition cannot be discussed here. The primitive attempts of the viceroyalty of Mexico to carry on the work so effectively begun by Balmis form a chapter in the development of public health administration which deserves extended but separate treatment. The subsequent visits of Balmis to Mexico and his activities in Spanish medicine are purely biographical and of only personal interest. The rather sordid controversy with Gutierrez over the personal finances and peccadillos of the latter are best left buried in the documents of the Mexican National Archive.

[98] Viceroy to Balmis, Mexico, January 10, 1805. *Epid.* IV, *Exp.* 13: 30.
[99] Viceroy to Captain General, Mexico, January 22, 1805. *Epid.* IV, *Exp.* 13: 56.
[100] *Epid.* IV, *Exp.* 13: 45.
[101] Balmis to Gutierrez, Manila, August 30 and 31, 1805. *Epid.* XVII, *Exp.* 8: 169-173.
[102] Viceroy to Gutierrez, Mexico, November 27, 1807. *Epid.* XVII, *Exp.* 8: 108. Gutierrez to Viceroy, Mexico, October 9, 1810. *Epid.* XVII, *Exp.* 8: 21.

APPENDIX I

Royal Orders of September 1, 1803, San Ildefonso

Royal Orders: on the propagation and inoculation of vaccine in this kingdom by those commissioned for this purpose and the salaries they should receive:

His Majesty the King, considering the ravages caused by smallpox in his dominions, and being desirous of granting to his beloved vassals the aid dictated by humanity, the welfare of the state and the interests of the public itself, and of those numerous classes which, possessing less material wealth, suffer greater damage than the others, all being worthy of the Royal beneficence, and after having heard the opinion of the Council and several scientists, has graciously resolved that the vaccine, accredited in Spain and throughout Europe, be propagated to both Americas and, if feasible to the Philippine Islands, at the expense of the Royal Treasury, as a preventative of "natural" smallpox.* For this purpose he has ordered the formation of a special expedition, composed of capable professional men and directed by his honorary Physician of the Chamber, Don Francisco Xavier de Balmis, who should set sail as soon as possible from the Port of Coruña, taking a sufficient number of small boys who have not had smallpox. These, being vaccinated in regular succession in the course of the voyage, the first inoculation from arm to arm, may be performed on arrival at the Indies. This is the most efficacious means of conserving and perpetuating the true vaccine fluid.

With the object of ensuring the success of the undertaking and the introduction of so valuable a discovery everywhere possible in the Dominions of the King, His Majesty has ordered that the vessel of the expedition call at Teneriffe and Puerto Rico and terminate the voyage at the Port of Havana, Island of Cuba, remaining there the number of days requisite for the vaccination of the natives. In all three ports the commissioners are to reside. Meanwhile the governor of the last named port should prepare another vessel or packet of the Royal Navy, if one is available, or some merchant vessel, for transport to Vera Cruz, the passage and rations to be charged to the account of the Royal Treasury. In this connection your Excellency (the Viceroy) will have to forward advance orders to your city (i. e. Mexico City), to Vera Cruz, as well as Puebla as to the route to be followed, so that carriages to convey the individuals of the expedition may be furnished, that the boys and their limited baggage may be transported at the expense of the Royal Treasury, and that they may be comfortably lodged. (The latter should be) at the expense of their *Proprios y Arbitrios*** if the *Ayunta-*

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* *Viruelas naturales*, active virulent smallpox, in contradistinction to *varicela* or *viruelas locas*, the mild form, and *viruelas bastardas*, chickenpox.

** *Proprios y Arbitrios*: local or municipal funds raised by taxation or from donations.

mientos are favorably inclined and reciprocate the benefit received with this small courtesy, but if not then at the expense of the Royal Treasury. The same applies to the maintenance and attendance of the boys, but that of the commissioned personnel should be at their own expense.

During their residence in your capital, Vera Cruz, or any principal city along the route they will occupy themselves with communicating the vaccine fluids to the natives gratuitously, thus instructing the medical practitioners and other persons desiring to take advantage of the opportunity to practice inoculation. They will also distribute, in cooperation with your Excellency, some vials, and also some books, from the 500 copies that the Director has with him, purchased at the expense of the Royal Treasury—the "Historical Treatise on Vaccination"—the most comprehensive and instructive work of the type, written by Moreau de la Sarthe, and translated by Balmis himself. Also you are to take some small boys from the Foundling Home if the Director so requests, with the previous consent of the parents if they are known. Also since His Majesty has offered to those arriving in your kingdom (i.e. the boys with the expedition) their maintenance and education until they secure training and employment from which to derive a livelihood, I recommend to your Excellency that this offer be accepted, to which end they may be placed in that educational institution where the objective may be attained with the greatest facility and economy. Those boys who were taken under such stipulation shall be returned to the home town.

If the expedition should arrive intact at that capital (probably means Vera Cruz) not having been divided since calling at the Islands, or if only a part thereof reaches the mainland, your Excellency, jointly with the Director, will determine the easiest and shortest route to follow, by sea or by land, to continue the journey to the provinces of Peru. For this your Excellency will fit it out, at the cost of the Royal Treasury, with carriages or pack animals for travel by land, ordering the towns to provide comfortable accommodations promptly and according to the conditions specified, and if by sea you will supply a vessel of Royal Navy, a packet or merchant vessel. In this and all cases you will exercise due economy, defraying the expenses from the Royal Treasury of your capital, as well as the respective salaries accruing to the members (of the expedition) which are effective as of the first of the current month, according to the attached list, showing deductions and other arrangements, as well as extraordinary expenses of the Director of the Commission, together with any other minor or unforeseen items, verified by voucher and meriting approval.

At an appropriate time your Excellency should arrive at an understanding with the Director as to the personnel designated to embark in the vessel at Acapulco next year for the Philippines. These the Director will provide with instructions, copies of his work, vials, and other requisites pertaining to the operations. Your Excellency will furnish foundlings who have not had

smallpox, with previous consent of the parents if known, together with any advance payments which may be due them with any other aid on the land trip, on the supposition that once aboard they will be transported and receive maintenance. You will communicate directly with the governor and captain general of the Islands regarding proper treatment and education for them according to their class until they obtain employment or means of livelihood. Furthermore, you will attend to the reception, lodging and payments of salaries of the individuals designated to establish the inoculation of the vaccine until they have occasion to return to Spain. Likewise, the King hopes, in consequence of your Excellency's well-known zeal that you will undertake, with persuasion and other moderate means, to introduce and conserve the vaccine in the communities under your jurisdiction and also recommend this salutary practice in the provinces. The latter should be notified of the expedition so that they may send practitioners for instructions and to propagate the fluid since it is understood that the operations of the Director and his subordinates are limited to the capitals and towns along the route and such others as may be deemed advisable. Their care should be entrusted to the respective magistrates and the latter should be instructed to render all assistance demanded by considerations of humanity. As to the important commission of the expedition you should issue any other orders necessary for it, during its sojourn as well as during the continuation of the journey. In due time you should communicate the results to me, so that I may impart the information to His Majesty.

May God protect your Excellency many years . . . etc.

APPENDIX II

Means for the Maintenance and Perpetuation of the Precious Vaccine in this, the Capital of Mexico.

It has been demonstrated by experience that the vaccine entrusted to the care of physicians and priests has been exhausted in many places. If it is to be conserved, it is indispensible that other means be adopted which, in my opinion, are the same as those established elsewhere by me successfully, following the example of many years in Europe.

It is therefore necessary to create a central vaccination board (*Junta Central de Vacuna*) in this capital, under the immediate sponsorship of the supreme government and the illustrious archbishops, and to establish a clinic where public vaccinations may be made and at which all those desiring to avail themselves of this benefaction may present themselves.

Concerning the Establishment of a Central Board in Mexico.

Art. 1. As already specified this Board, which will function under the immediate sponsorship of the supreme government and the illustrious arch-

bishop, shall be composed of seven or eight most honored and distinguished persons, ecclesiastical as well as secular, and who have manifested the greatest interest in the public welfare. One of them shall be elected to serve as chairman (*Presidente*). The *Regidor Decano* and the *Sindico Procurador General* of this *Ayuntamiento* shall serve *ex officio* as members of a body that represents and promotes the rights and benefits of the inhabitants of this city. Furthermore there shall be six members, Professors of the Art of Healing, who have proven themselves favorable to the propagation of so important a discovery.

Art. 2. This Board shall have a secretary who will conduct the correspondence arising between it and the towns and provinces of these viceregal domains. He shall keep a record in which is to be noted everything pertaining to administration, financial matters, measures for supplying the fluid to the towns and other non-scientific data. This office could be discharged by a member of the Board who would be kind enough to contribute this service. There shall also be a professional (*facultativo*) secretary who will enter in another record everything occurring in the practise of vaccination, its effects, anomalies and special observations made. In addition he should render a report to the Board at its first session so that it may go into conference and make such resolutions as it deems pertinent.

Art. 3. This Central Board shall hold its meetings twice a month, at the date and hour most convenient, to treat not only of the examination and number of those vaccinated during the previous week, but also of the various questions arising or incidents occurring in the towns of which this capital is the administrative head, the method for sending vaccine to other parts, and orders to their respective medical men to come and receive instruction in this practise and acquire the knowledge necessary to handle it with dexterity. These meetings may be held in the house designated for public vaccinations.

Art. 4. No member of the Board shall receive any salary whatever, by virtue of the fact that this honorable, beneficent and laudable occupation, so highly recommended by the King, is discharged for the benefit of humanity and the health of their fellow citizens, for whom all ought gladly to make some sacrifice. For this reason it would prove advantageous to renew every year one-half of the Board members so that by this alternation the brief inconvenience may be distributed among all—this high honor of being engaged in so distinguished a service to their country. However, the secretaries should be reimbursed for the expenses of attending to the correspondence and maintaining the office.

Art. 5. The Board shall appoint for the period of one month two of its professional members who will have charge of the public vaccinations. These should ordinarily take place every nine or ten days in this city. Thus it

would be incumbent upon them to devote their efforts to this duty only for the brief time of three periods a month and, inasmuch as the professional members engaged in this occupation should likewise alternate, it would result that in the course of a year, and during the four months in turn for each two physicians, they each would have to conduct but twelve public vaccinations.

Art. 6. Persons not possessing the requisite written permit, issued by the Central Board, shall not be permitted to practice vaccination. The Board shall guard against the production of false vaccine and the propagation thereof so that in no way the fluid resulting from eruptions caused by the false vaccine may be preserved. In addition to the damage and injury that this is likely to cause, the use of any but the most true and genuine fluid by the vaccinator is vicious. Everything should be done to eliminate the many factors causing the deterioration of the true vaccine and the loss of its valuable properties.

Art. 7. Furthermore the Board shall zealously guard against the inoculation by any physician of virulent smallpox (*viruelas naturales*), a practice that the superior government should strictly prohibit in order to extirpate its noxious toxic forms by all means available, so that those who through negligence and ignorance did not avail themselves of this excellent preventative may not become infected.

Art. 8. Whenever it comes to the attention of the Board that, despite these precautions, and those of the respective local authorities, smallpox is raging in any city or town of this kingdom, the Board, in accord with his Excellency, shall commission an intelligent vaccinator to convey this precious fluid and, by means of its propagation, terminate the variolar contagion. He should be granted a gratuity from the public funds of the town to which this benefit is extended or otherwise rewarded in a form deemed more appropriate and just. He should also instruct the physician or other competent party of the town affected in everything concerning the practice of vaccination.

Art. 9. One of the principal obligations of the Board will be to appoint and maintain corresponding members in all the districts of this kingdom who will frequently investigate the herds of cattle and ascertain if perchance cowpox, or smallpox of the cows, is to be found on the nipples of the udders of the animals, as found in England, especially during autumn and spring. These corresponding members should be practitioners capable of making tests on the said matter from such cowpox as may be discovered and of describing the results in such a manner as to compare them with those obtained with the true vaccine known to us. However, if professional men are lacking, there may be distinguished and learned laymen endowed with zeal, activity and concern for the good of their compatriots. Their duty shall

be immediately to advise the Board of any new discovery so that it may order confirmation of the experiments performed. Thereby the Board may obtain assurance concerning a matter of such significance, a medium so susceptible of perpetuating and prolonging human life.

Art. 10. It is beyond question that the precious vaccine not only possesses preventive value against smallpox, but is also endowed with the faculty of curing many maladies, particularly those classed as cutaneous. It improves and fortifies the sickly and delicate condition of those vaccinated and combats the development of scrofulous ailments. Finally, in my opinion it would be advisable for the Board to test it on patients afflicted with elephantiasis and epidemic gangrene (*fuego de San Anton*). From the fact that recent observations made in Constantinople have demonstrated that this admirable fluid is a very efficacious preventive of the plague, we hope that it may prove likewise so of the maladies commonly known as the yellow fevers (*vomito prieto, fiebre amarilla*). The latter seem to be differentiated from the true plague of Turkey solely in the malignancy of the latter, leading us to deduce the idea that we may succeed in obtaining a specific against these cruel scourges of mankind which have caused such destruction, particularly among those recently arrived from Europe.

Art. 11. The person in charge of the Secretariat shall note in his record the number of those vaccinated, the discoveries that may be made and the maladies which may have been cured in consequence of the new practice, together with comments of the physicians who made the observations. Moreover, since His Majesty wishes that the result of the voyage of this Royal Expedition should be published, and on account of the many important discoveries which it may make on its extensive travels, it would be desirable that anything of general interest, and any observations worthy of notice, be communicated and made public. The Director gives assurance that, far from defrauding anyone of the honor and merit he deserves, he will recommend such a person and submit his name to the high consideration of the Sovereign.

Art. 12. In view of the Royal desire of His Majesty to assure the success of the undertaking, he (Balmis) recommends it to the illustrious Archbishops and Bishops, to the heads of the districts of America, counting on all aid, spiritual and temporal, from these worthy dignitaries, to whom the secretary shall submit a monthly list of those vaccinated and other information. The secretary will also keep in touch with the Viceroy so that he may issue necessary instructions and with the Archbishop when he requires a list of parishioners not vaccinated, or a record of births to be obtained from the parish priests of the Diocese.

Art. 13. Considering the profound significance to this kingdom of the conservation of the precious vaccine, and in order to obviate the possibility that through accident or neglect it may become exhausted, it is essential that

Central Boards be created in all the large cities of this kingdom, such as Puebla, Valladolid, Guanajuato, Guadalajara, etc. as well as Public Vaccination Clinics, as I propose for Mexico City, for in that manner one town may afford succor to another in any emergency.

Art. 14. The creation of the several Boards and the Public Vaccination Clinics, besides serving to propagate the valuable preventative and perpetuate it will also make possible increased experimentation, thus tending to demonstrate more and more the advantages of this beneficent practice and its properties, as they continue to be discovered. In this connection it would be very appropriate for these societies to maintain correspondence among each other, communicating findings for discussion and decision.

Concerning the Establishment of a Public Vaccination Clinic

The Public Vaccination Clinic should be located in the center of the city and should be comfortable and clean. This is so that the public may congregate there, experiencing a minimum of tediousness, to receive the benefit granted it gratuitously. Over the door there should be a sign reading "Public Vaccination Clinic." It would be inappropriate, at least at the beginning, to utilize hospitals, hospices or foundling homes to deposit so valuable a prophylactic, for aside from the dislike and abhorrence with which these institutions are commonly regarded, a factor which would contribute greatly to the reluctance of the public, the filth and emaciation of the inmates would much deter attendance on the part of the public, for the mothers do not want their children vaccinated except from the healthiest carriers, robust and of good appearance, as I have seen everywhere.

Convinced of this necessity, all the nations of Europe have granted the best locations for vaccinations, granted by the generosity of the municipalities, and also the Consistorial Houses of the cities, when the authorities did not have other places with which to honor the new and admirable preventative. The great progress which has been made in all parts of the world, despite the greater advancement of Europe, has been due to the zeal and munificence with which the courts have created and endowed these institutions (the clinics) and the incredible fervor with which the most learned scholars have taken charge of the propagation of vaccine, founding societies and creating public clinics as well as central boards of vaccination.

But in America culture is less advanced. The character of the natives is such that they are as a rule indifferent and inactive. They look upon even the greatest favors offered by others with the greatest mistrust. They prefer to continue their errors and fall victims to the death-dealing epidemics which are so prevalent among them rather than have recourse to the salutary medicines offered them by the physicians who are commissioned by the heads of the American Districts, as the latter themselves have assured me. In

America, I repeat, it requires profound study and skill to secure the acceptance of so great a blessing, for it is very difficult to get the people to submit to anything unknown to their forefathers. Therefore it is necessary that the venerable parish priests, the officials and physicians, together with all enlightened people, especially those in whose hands rests the superior government, should employ all persuasion to maintain a permanent place of deposit for the vaccine, to distribute it to the inhabitants, to convey it to places where it has not been taken, or where, unfortunately, it has disappeared and thus to erect a sanctuary to the beneficent vaccine and comply with the paternal intentions of the Sovereign and the duties of true patriots.

Art. 1. The Public Vaccination House should have comfortable rooms for the reception of the public coming to be vaccinated, its care and cleanliness to be attended to by a porter, who will be appointed without further recompense than a room to live in. He will be required to be present at the vaccinations, which are to take place once a week, in order to maintain peace and order while the professional members (of the Board) are vaccinating. At the Board meeting, to take place every few days, he should be present to provide lights if necessary, and should also post a placard on the door of the Clinic announcing sufficiently in advance the date and hour of vaccinations.

Art. 2. The professional members are to vaccinate gratuitously all those presenting themselves; this in view of the limited amount of work required of them per annum. It is required of these members of this distinguished Board, as already stated, to attend only twelve vaccinations in a whole year, and the gratitude of the public is the best reward that a sensible man may expect. A member should be present at the public vaccination, which must take place once a week, in order to lend them formality, and also for any other purposes which may be appropriate.

Art. 3. One of the members shall be in charge of the Treasury. He will collect the small amounts that may accrue through the generosity of the illustrious Archbishop, the very illustrious Ayuntamiento and persons of position and distribute the funds in payment for indispensible expenses, such as those incurred by the secretary's office, by the two secretaries for mail, lights, and rental of the house. He shall pay also any gratuity that the Board may grant the porter, according to the zeal and activity he manifests.

Art. 4. The members and physicians who attend a vaccination shall impress upon the parents of the children just vaccinated their obligation to appear at the day and hour designated for the following week, so that the matter of the pustules may serve for others. They shall take note of the name, street and house number so that they (the parents) may not fail to appear on the date specified. These are the most effective measures and the least expensive for if the parents are persons of some standing they will

never refuse to render this good service in consideration of the fact that they, glad of this benefit received by their children, are willing to aid in communicating it to others. However if those vaccinated are miserably poor, they likewise should be induced to appear on the day indicated, offering them one peso, or whatever the Board may decide, in the way of a gratuity, for rendering this valuable service.

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TEXTS AND DOCUMENTS

A MEDIEVAL TRANSLATION OF RHAZES' CLINICAL OBSERVATIONS

OWSEI TEMKIN

I

To the Middle Ages, Mohammedan, Jewish, and Christian alike, Abū Bakr Muḥammad Ibn Zakariyyā' Ar-Rāzī (865-925) was outstanding as a teacher of clinical medicine. His *Continens*, the *Liber ad Almansorem*, the treatise *On Smallpox and Measles*, and several other minor works were all among the early medical publications of the European printing presses.[1] The minor works printed as early as the 15th century included the so-called *Aphorisms* of Rhazes and the third book of these aphorisms represents a small collection of case-histories from his practice. Referring to this collection Albrecht von Haller remarked: "This booklet above all deserves to be read."[2] Of the cases mentioned the very first is of particular interest, since it deals with the author himself. Rhazes says that as a student of medicine and philosophy he spent many sleepless nights, lived carelessly, inhaled the oil of water-lilies and ate much lettuce. These things weakened his eye-sight and his sexual vigour, but his strength and his memory (or eye-sight?) were restored by a diet of sparrows, eggs etc. In addition he invented an oil which he praised as a powerful aphrodisiac.[3] This autobiographical fragment—if it can be

[1] Cf. L. Choulant, *Handbuch der Bücherkunde für die ältere Medicin*, Leipzig, 1841, p. 342 ff.

[2] A. v. Haller, *Bibliotheca Medicinae Practicae*, T. I, Basileae, 1776, p. 375: "Hic libellus etiam potissimum legi meretur."

[3] *Abubetri Rhazae Maomethi . . . opera exquisitiora.* Basileae, 1544, p. 529: "In parte mei temporis in Philosophia et Medicina studens, multis vigilavi noctibus, et somnum amisi, et feci res quae non valuerunt, et nihil inveni quod tantum conferret, quam oleum nenufaris, quod in nasum trahendo aerem proiecti, et lactucae quas coctas et crudas comedebam. Visus tamen debilitatem et minorationem coitus in me generaverunt, et non inveni quod conferret tantum mihi, quantum passerum comestio, et ipsorum brodium cum ovis et almuri, et in cinnamomo et pipere, et pullorum columbarum praeparatorum, et in me vis et memoria fuit optime restituta. Ad hoc oleum feci, quo nullum melius invenitur: Recipe olei granorum pineae,

credited at all—is not without interest with a view to the stories which later biographers had to tell about Rhazes' blindness.[4]

II

Some twenty years ago Rhazes' fame as a clinician was further enhanced when E. G. Browne drew attention to another collection of clinical observations from the pen of Rhazes. These case-histories (which are not to be confounded with those in the aphorisms mentioned above) are contained in Arabic in a manuscript of the Bodleian Library (Marsh 156), supposed to belong to a part of the *Continens*.[5] Browne published and translated the first case only, but in 1935 Max Meyerhof edited and translated them all.[6] Meyerhof's publication, prefaced by comments on Rhazes and his *Continens*, and accompanied by valuable notes on the medical and cultural content of the case-histories, gave an impressive picture of Rhazes as a clinical observer and therapeutist.

In 1938, while working at the British Museum, I had to consult the Latin edition of the *Continens*, Venice 1509 (541 k 13). On opening the huge volume, I noticed that the actual *Continens* was preceded by a short treatise which I immediately recognized as a Latin version of the case-histories discovered by Browne. As indicated by the incipit and explicit, the collection was called "the little book of Rhazes on the marvellous things that happened to him in medicine." It is contained on fols. ✠ II^{recto}—✠ III^{verso} and follows upon a deontological text with the explicit (fol. ✠ II^{recto}): "Explicit libellus Rasis de his que debet habere inter cetera medicus approbatione dignus." [7]

olei alben, olei alkeiri, olei pomorum dulcium, ana partem unam, fellium passerum cum voluntatem habent coeundi, partem mediam, seminis alkeiri pallidi, mechal I bulliant omnia ad ignem levem. Cui ab igne removendo, moschi mechal semis misceatur, cum quo genitalia, et pectus post balneum ungantur, provocat virtutem, et delectationem vigorat." The story is repeated in a somewhat different version on p. 532 f. according to which the diet restored his vision.

[4] Cf. Julius Ruska, *Al Rāzī's Buch Geheimnis der Geheimnisse*, Berlin 1937, p. 4 f. (Quellen u. Studien z. Gesch. d. Naturwissensch. u. d. Medizin, Bd. 6).

[5] Cf. E. G. Browne, *Arabian Medicine*, Cambridge, 1921, p. 49 ff.

[6] Max Meyerhof, Thirty-three clinical observations by Rhazes (circa 900 A. D.), *Isis*, 23, 1935, pp. 321-372.

[7] This explicit is very similar to the title of number 133 of Rhazes' bibliography

I do not know when or by whom the Latin translation of these case-histories was made. The *Continens*, as is well known, was translated in the 13th century by the Jew Faraj Ben Salem, but the question whether the clinical observations originally were incorporated in the *Continens* is still unsolved.[8]

However this may be, the fact remains that for at least 412 years prior to Browne's book, a translation of these clinical observations was accessible to western scholars, though apparently its existence was hardly noticed. This, together with the fact that it is not included in all the Latin editions of the *Continens*,[9] induced me to republish the Latin text from a photostatic copy kindly supplied to me by the authorities of the British Museum.

The Latin text is divided into two chapters. The names of the patients are so mutilated as to be hardly recognisable. Otherwise, if due allowance is made for the barbaric Latin and the often senseless interpunctuation, the translation of an admittedly difficult Arabic text[10] compares not unfavorably with the medieval translations of many other Arabic authors. Compared with Meyerhof's publication, the Latin text shows many differences, some of them too grave to be accounted for by different interpretations. For instance, the paragraph on the case of the Hippocratic Epidemics which in Meyerhof's text stands between cases XXVII and XXVIII (according to Meyerhof's enumeration) follows case 3 of the Latin text (case XXIV of Meyerhof's), an arrangement that seems more satisfactory. While case 7 of the Latin text seems to correspond to case II of Meyerhof's, there is considerable confusion in the epicrises (cf. also footnotes 12 and 19). These and similar discrepancies can only be explained on the assumption that the Latin translator used an Arabic manuscript different from that of the Bodleian Library.

as given by George S. A. Ranking, The Life and Works of Rhazes (Abū Bakr Muḥammad Bin Zakarīya Ar-Rāzī *XVIIth International Congress of Medicine, London: 1913*, Section XXIII, History of Medicine, London 1914, p. 261.

[8] Dr. Meyerhof's search for the clinical cases in the Latin *Continens* was unsuccessful, for he writes *loc. cit.* p. 330: "They are missing from the Latin translation as I am informed by Dr. Paul Kraus (of Paris), to whom I am indebted for the search he made for me in one of the editions of the *Continens*." This seems to prove that the little collection was not included in all the Latin editions of the *Continens*.

[9] Cf. preceding footnote.

[10] Cf. Browne, *l. c.*, p. 51.

In the following transcription I have confined myself to lengthening the abbreviations, modernising the use of u, v, i and j, correcting a few minor typographical errors, and assigning separate paragraphs to the single case-histories. I have given running numbers to the cases, adding Meyerhof's numbers in parentheses.

Text

Incipit libellus eiusdem de mirabilibus que ei acciderunt in medicina: duo habens capitula.

Quorum primum est de mirabilibus egritudinibus quas vidit cum earum multiplicibus signis causis et accidentibus atque pronosticationibus.

In nomine dei misericordis et miseratoris incipiam ponere in hoc libro exempla et mira que mihi multotiens evenerunt cum infirmis: et reddam in hoc loco quod scriptum est in questionibus epidimiarum de eventibus infirmorum: et non tardabo: quia est multi et magni iuvamenti: et nolui adhuc istud ponere: sed nunc intendo hoc scribere et coadunare ipsum in hoc tractatu: ut possum melius explanare quod mihi evenit de infirmis si deus voluerit.

1 (I) Abdalla filius subede passus fuit febres permixtas: quarum aliqua fuit sextana: alia tertiana: alia quartana: alia quotidiana: et omnes has precedebat rigor parvus: et sepe urinabat: et tunc pronosticatus fui quia in possibile erat: quod alias quin omnes he febres transirent in quartanam: aut quin haberet apostema in renibus: et non moratus est per longum tempus: et urinavit saniem: et pronosticatus similiter fui quod non poterat in dictas febres recidivare: et sic fuit: et defeci dicere in principio ipsum pati in renibus: et propter febres permixtas quas patiebatur: et erat mee opinionis quod omnes febres erant ex humoribus adustis: propter quod transeunt in quartanam vel apostema in renibus: et sentiebat proculdubio ante hoc cum iacebat magnum pondus in renibus et gravedinem: et defeci querere ab eo hoc: et quia multum urinabat fortificavi meam opinionem quod pateretur apostema in renibus: et intellexi postea quod pater eius habebat vesicam debilem: et patiebatur hunc morbum: et ipse etiam patiebatur hunc in sua salute: et totum hoc dico ut perspicue inquiras de omnibus cum inveneris similem infirmum et nihil omittas de contingentibus si deus voluerit: et ego non quesivi de ponderositate

renum suorum nisi postquam vidi ipsum urinantem saniem: et cogitavi apostema esse parvum: quia sanies erat pauca: et cito mundificata extitit: et medici qui aderant una mecum in eius cura ante et post non cognoverunt eius dispositionem.[11]

Et necessario debes cognoscere quod multotiens evenit pluribus dolor in ventre propter motum colere maligne sparse per intestina similis colice: et non erat: et in ultimo incurrunt dissinteriam vehementem malam: et evenit hoc proprie habentibus complexionem melancolicam: sicut fuit alech.[12]

2 (V) Accidit machumet filio alchasem pruritus in corpore et bothor: et bothor etiam in virga non cum eius capite: et pronosticatus fui quod evenirent in capite eius virge: quia videram ipsum prius emittentem saniem cum urina: et sic fuit.

Et tu debes ponere intentionem tuam ad sciendum quod in matrice accidunt morbi similes ydropisi.[13]

3 (XXIV) Filius hebisneyd passus est febrem cum fluxu colerico: et mane diei quarti urinavit sanguinem: et egessit coleram viridem sanguinolentam similem loture carnium recentium cum casu virtutis: et miratus sum satis de hoc: quia morbus videbatur quietus et levis: et mutatus est una nocte in tantam fortitudinem et violentiam: quod opinatus fui sibi datum fuisse aliquod aconitum: et versus horam vespertinam urinavit urinam nigram: et emisit egestionem nigram et passus est blactias malignas similes porris declinantes ad interiora et mortuus fuit sexto die in mane.

In dictione prima particula tertia inquit ypocras [14] eger unus febricitavit febre acuta vehementis caliditatis per unum diem: et postea sudavit illa nocte multo sudore: et non est febris ex hoc sudore diminuta nec alleviata: et remansit in hac dispositione tota nocte: et die secundo hec accidentia magis fortificata sunt et sero factum est sibi suppositorium: et assellavit: et alleviatus est tota illa nocte usque ad medietatem tertie diei: et sero eiusdem mota est febris cum vehementi siti et oris siccitate et sudore: ex quo non fuit febris alleviata omnino: cum permixtione et alienatione: et urinavit illa nocte

[11] The therapy of this case is misplaced to the beginning of part 2.
[12] This paragraph is misplaced. It seems to belong to case 7.
[13] This paragraph should follow case 27; cf. Meyerhof, *l. c.*, p. 343.
[14] Ed. "ypo."

urinam nigram: et quarto die accidentia sunt magis augmentata: et urinavit similiter urinam nigram: et illa nocte etiam usque ad medietatem quinte diei alleviatus est: et postea emisit e naribus guttas sanguinis nigri: et urinavit urinam in qua erat nephesis quasi sperma diverse dispositionis et forme rotunde et alia: et nullam faciebat residentiam diebus posterieis: et tota illa nocte sustinuit magnum laborem: et extremitates erant frigide: et non poterant calefieri absque magno labore: et diminutus est eius somnus: et urinavit urinam nigram: et quievit: et mane sexte diei apopleticatus est: et sudavit sudore frigido: et eius extremitates facte sunt virides versus meridiem: et mortuus est: et totus eius sudor in hoc morbo erat frigidus: et anhelitus altus et rarus: et a prima nocte apperuerunt signa maligna: quia sudabat: et febris non aleviabatur propter hoc. Et iam dixit Ypocras [15] quod res propter quas debet evenire crisis si non evenit ex eis: aut significabunt mortem quando sunt cum signis mortalibus: aut morbi prolixitatem: et quando sunt cum signis salutis febris alleviabitur cum sudore: et hec febris minime fiebat levis: et secundo die erat fortior: et quando urinavit urinam nigram tertio die certificate sunt significationes maligne: et apparuit post rem debentem inducere crisim aliud signum mortale fortificans primam significationem: et non fuit alleviatus propter sudorem: et secute sunt hec: vigilie: permixtio: et sitis: et quarta die fortificata sunt accidentia: urinavit urinam nigram: ex quo habui duo mala signa: unum quia eius morbus erat fortior in die pari: eo quod fortificabatur in secundo die: et secundum iudicabat mortem futuram evenire in pari: et quartus erat indicativus sexti et septimi: et quando acuitas est vehemens et peracuta: et apparent signa mortalia: non transcendit morbus septimum diem: et quando in sexto evenit parosismus cum accidentibus terribilibus: eodem die deficit infirmus: et certum erat quod crisis fiebat in sexto: cum urina apparebat nigra in tertia et in quarta: et hoc significat ultimitatem malitie acuitatis: et quando hec duo sunt violenta et coniuncta: significatio acuitatis erit fortis et difficilis: et gutte sanguinis e naribus pauce et nigre in quinto ostendebant debilitatem virtutis: et si virtus fuisset fortior et accidentia mala fuissent debiliora: crisis fuisset in octavo: et eius anhelitus declarabat permixtionem sensus: prout narratum est in

[15] Ed. "Ypo."

epidemiis: et sudor frigidus cum prolixitate morbi significabat egri debilitatem: et non morbi diminutionem: et in levitate quam sentiebat patiens in aliqua hora istorum dierum non erat aliqua spes boni apponenda: quia erat absque aliqua bona crisi et manifesta determinatione: et quecumque quies apparet in nis morbis absque ratione: cito reddit in suum contrarium: et hec sunt verba Ypocratis [16] et nephesim et similem spermati ut narravi: et omnia alia accidentia hic posita narrata sunt in pronosticis in libro de crisi: et dierum creticorum: et in ultimo epidimiarum: ubi loquitur de tertiana continua.

4 (XXIX) Abulchriseyn filius elemosine patiebatur difficilem corizam: et vigilias: et nunquam vidi alicui difficiliorem morbum isto: et maior pars materie fluebat ad pectus: et ducebatur cum tussi: et screatu: et propter multas vigilias debebat bene mundificari: et quolibet die mundificabatur in meridie: et nil exinde sentiebat: sentiebat tamen dolorem iuncturarum: et hoc fuit prout narravit Galenus [17] quia expulsio superfluitatum non est per manifestos meatus: sed per membrorum iuncturas: sicut erat in isto: cui cum materia non fluebat ad pectus declinabat ad iuncturas: et illic dolor sentiebatur.

5 (XXXIII) Hebuhamar filius exenii febricitavit: et est passus fortem ycteritiam et grossam: ita quod oculi apparebant sicut petia una tincta ex floribus id est cartami lussur: et hoc apparuit quinta die: et nona die denegata est urina: et non urinabat nisi parum guttatim coloris fellis: et egessit nigrum: et in quinto apparuit urina nigra et postea redibat urina rubea cum spuma crocea: et nocte undecima emanavit multum sanguinem ex nare dextra: deinde accidit ei singultus et corriza: et mortuus est nocte tertiadecima: et semper eius sensus erat salvus: manifeste tamen apparebat sensui apostema epatis.

6 (XXXIV) Filius miscur habebat medietatem corporis in longum calidam: et reliquam medietatem frigidam ut nix: et pulsus lateris frigidi erat defectus: et alterius erat velox: et oculus partis infrigidate erat diminutus et contractus multum: et corde colli erant spasmate: et urina alba ut aqua.

Capitulum II est de mirabilibus curis quas fuit expertus rasis.

Dico inter mirabiles curas quas fui expertus. Abdalla filius subede

[16] Ed. "Ypo." [17] Ed. "Gal."

quando urinavit urinam saniosam: curavi cum rebus mundificantibus et provocantibus urinam: et facta est urina clara et mundificata a sanie: et postea exhibui ei in potu luthum sigillatum: thus et sanguinem draconis: et fuit liberatus velociter et completa liberatione infra duos menses.[18]

7 (II) Eventus autem habet ambachiste: venit ipse uno die ad me: et conquestus est de dolore colyco: et non narravit mihi qualiter sibi evenit: nec ego quesivi ab eo: iniunxi ei quod acciperet de dyadactilon: accepit et convaluit: et post parvum tempus recidivavit in dolorem ventris cum stipticitate intestinorum: et supervenit sibi dissinteria melancolica: et mortuus est me absente: et cum evenit hic dolor in ventre propter motum colere maligne sparse per intestina similis colice: et non erat: et in ultimo incurrunt dissinteriam vehementem malam: et cura istorum debet esse laxare eos cum medicinis lenitivis: et postea da eis in potu et per clystere res glutinosas si deus voluerit: et pluries ego hoc vidi.[19]

8 (III) Eventus filii emurgay. Hic homo paratus erat ad byrsen: et prius quam fuissem vocatus ad eum incidit in sirsen: et fuit liberatus ab ea: quia materia fluxit ad aurem: et fuerunt in ea generate fistule: et fuerat flobothomatus in hoc morbo: et cronicata est sanies auris ex imperitia medicorum: et indurata et petrificata est sanies in simach id est os petrosum quod est in instrumento auditus: et evenit propter apostema ortum in radice auris: et quando ulcus est in aure cronicatum consuetudo nostra est flobothomare ad derivandum materiam ad aliam partem: hoc est ad radicem auris: et istud apostema ortum in radice auris ductum est ad saniem: et ultimo curavi eum: et cessavit: et remansit aliquod residuum mali humoris primi morbi: quia non fuerat mundificatus forti mundificatione nisi solum per derivationem factam ad aurem: et hic comedit post hunc morbum capita: et laboravit multum et incidit in febrem continuam: nauseam: murmurationem: et ventris stipticitatem: et sumpsit aquam fructuum et lenia: et eiecit ea per os: et accessi ad eum die III et inveni quod supervenerat ei vehemens soda: et fugiebat aspectum lucis: et habebat rubedinem in oculis: et plurimum lachrymabatur: et tunc flobothomavi eum: et non extraxi multum

[18] This is the therapy of case I.

[19] Cf. footnote 12.

sanguinem: dubitans de murmuratione populi: et intentionis mee erat sequenti die laxare eius ventrem: sed eodem die alleviatus est in maiori parte eius quod patiebatur: et semper dubitabam ne incideret in sirsem: et inceperunt apparere signa eius: et ideo nolui ei exibere medicinam violentam et laxativam: dubitans similiter de redargutione et murmuratione vulgi: et exibui ei medulam cassie fistule et similis: et non assellavit: precepi sibi fieri clystere: et non fuit sibi factum: et ego steti per tres dies et non ivi ad eum: et vocatus et rogatus ad eum accessi: et inveni eum deterioratum: et morbum fortificatum: et eius urina tendebat ad croceitatem: et facies erat inflata: et intentionis mee fuit educere sanguinem e naribus: et abstinui occasione vulgarium: et nullus medicus erat in eius cura nisi ego: et non fuit mihi visum aliud tunc sibi administrare nisi aquam ordei: sperans laxare eius ventrem: et bibita nil profuit: et tunc mandavi ipsum bibere aquam cucurbite et muscillaginem psilii: et neglexit facere: et post IIII diem ab isto morbus augmentatus est: et inceperunt signa mala apparere: unus oculorum diminutus est: et lingua vehementer denigrata et ingrossata: et mortuus est eo die sicut ego fueram pronosticatus: et imperiti medici astantes opinabantur quod pateretur torturam ex humiditate propter adventum plurime diminutionis oculi dextri et propter spasmationem eiusdem lateris.

9 (IV) Vidi quemdam conquerentem de cordis tremore: et posui manum super mammillam sinistram: et sensi magnam eius arteriam valde pulsantem et velocem: et quesivi demonstrari mihi brachium nudum: ad videndum venam basilicam quam patiens dicebat fuisse flobothomatam et non contulit ei: et arteriam sitam iuxta ipsam venam in plica brachii inveni pulsantem et multum manifestam sensui: et caro illius partis vehementer ellevabatur et deponebatur: et satis apparenter: et cum comedebat res calidas iuvabatur ab eis: et tunc satis stupefactus et perplexus fui super hoc: et ei consului quod acciperet de diamusco: et eius pulsus erat sicut pulsus patientis asma et impedimentum anhelitus: et quamquam hi habeant amplum toracem: paucum possunt aerem atrahere et paucus subintrat.

10 (VI) Evenit cuidam venditori bombacis habenti barbam longam dolor cronicus in stomacho: et consului ei quod biberet vinum forte purum: etiam in continenti dolor declinavit versus umbilicum:

et retenta est urina eius: et sentiebat vesicam inflatam et repletam: et aliquis siringator me ignorante siringavit eum sepe: et provocata est eius urina: et exivit cum ea flegma album viscosum: et meditatus sum quod illud flegma erat causa doloris et retentionis urine: et liberatus est de omnibus ad plenum: et postea accidit sibi debilitas et laxitudo in ambobus pedibus: fecit me vocari: et inveni quod medici astantes faciebant inungi pedes cum unctionibus calidis: et putavi quod propter colligantiam morbi vesice communicantis cum nervis venientibus ad pedes ortum est apostema in radice ipsorum nervorum: et tunc emplastravi et inunxi eius renes: et incepit movere pedes: et in paucis diebus liberatus est.

11 (VII) Ebulchaseim sutor patiebatur morbum calidum: et liberatus est mea cura: et postea conquestus est de stomachi debilitate: et dedi sibi trociscos de rosis spicatos: et in continenti incidit in febrem acutam: curavi: et liberatus est.

12 (VIII) Quidam asinarius venit in quodam viagio mecum ad serviendum mihi cum sumerio suo: et accidit ei obtalmia: mandavi ipsum flobotomari de cephalica: et noluit: et carassavit in eius nucha: et instillavit in aures eius oleum rosaceum in quantitate unius uncie et plus: prohibui sibi satis quod non faceret: et ut homo dure cervicis et prave imaginationis obedire noluit: et sequenti die dolor augmentatus est: ita quod nunquam vidi tam difficilem et periculosam obtalmiam: et dubitavi ne scinderentur tunice oculorum et egrederetur aliquid de eorum substantia: et nil quasi remansit de cornea quod non esset coopertum nisi in quantitate unius lentis propter sublevationem apostematis coniunctive: et cum incepit gravari et affligi a morbo rediit ad me: et ego feci ipsum flobotomari bis: et extraxi in duabus vicibus quantitatem trium rotulorum sanguinis et plus: et abstersi oculos suos a lippitudine: et pulverizavi desuper pulverem album: et dormivit eo die: et cessavit dolor: etiam sequenti die liberatus est omnino: sic quod homines inceperunt multum mirari.

13 (IX) Chaleb tabri passus est morbum calidum ex labore et dedi ei in potu ptisanam et similia usquequo fuit aliqua facta extinctio: et supervenit ei nunc dolor ypocondriorum et inguinum: ex quo sustinuit magnum laborem et nocumentum: et plures medici opinati sunt quod esset colica: et preceperunt exhiberi ei electuaria

calida: quia putaverunt ptisanam ei nocuisse et stomachus eius esset mundificatus a morbo calido: et tunc tetigi loca dolentia: et inveni ipsa calida et dura: et quesivi ab eo si sentiret ibi aliquam repercussionem: et dixit satis magnam: certificatus sum illa hora quod in latere erat apostema calidum: et flobothomavi ipsum de basilica subassellari: et subtraxi fere ducentas dragmas una vice: et dedi ei in potu aquam uve vulpine et endivie cum pulpa cassiefistule per aliquos dies: et liberatus est: et die flobothomie sensit alleviationem: et opinatus fui quod aliqua per se materia erat extincta: et aliqua derivata est ad locum doloris.

14 (X) Quidam nomine Abet passus est morbum calidum et hic morbus mutabatur de loco ad locum: et urina apparuit tincta per plures dies: et aliqua hora sentiebat se gravem: et aliqua levem: et cum hoc toto urina non remittebatur in suo colore et febris ex ea eradicabatur et revertebatur: et precepi post parvum tempus quod flebothomaretur de basilica: et subtraxit minutor de sanguine ultra quantum voluerim: et eius urina rediit alba: et liberatus est.

15 (XI) Filia hebilthuseyn filii habuhe fuerat consueta bibere lac camelarum absque meo consilio: et cum sentiebat inflationem propter lac accipiebat de dyamusco corpore non purgato nec flobothomato: et occasione lactis incidit in febrem continuam de sanguine: et apparuerunt signa variolarum: et post quartum variole in suo corpore exiverunt: et ipsa misit pro me quod deberem ipsam curare. Et in principio collirizavi suos oculos: confortando eos cum antimonio dissoluto in aqua rosata: et propter hanc curam non exierunt variole in eius oculis: de quo erat valde verendum: sed circa oculos erant multe spisse et grosse: et mirate sunt vetule astantes ad eius servitia de salute et preservatione oculorum: et assiduavi ipsam recipere ptisanam et similia per aliquod tempus: et venter eius erat stipticus ut moris est in hoc morbo: et meliorata est: remansit tunc aliquid residui febris acute: putavi quod esset residuum humorum non eductorum per egestiones: et non poterat subito et semel in totum purgari propter debilitatem virtutis eius: feci tunc ipsam assiduare aquam fructuum quindecim diebus in aurora: et ptisanam in prima hora diei: et asselabat ex hoc bis in die: et fuit mundificata completa mundificatione: et post quadraginta dies apparuit in urina completa digestio: et post quinquaginta fuit liberata in totum.

16 (XII) Hebulchrisen filius abhuc erat grossi corporis: et medici opinabantur quod corpus eius esset humidum: et ignorabant facere differentiam inter pingue et carnosum: et patiebatur hic aliquod de dolore artetico: et aliquo die cecidit: et tunc flebothomavi eum sepe: et feci ipsum uti laxativo qualibet septimana educente coleram: quia humor eruginosus calidus peccabat: et cibavi ipsum cibis acetosis insipidis et stipticis: et prohibui sibi dulcia acuta et pinguia: et alleviatus est ab eo quod senserat: remansit tamen ei aliquod residuum pusillum et insensibile: et cum fuit usus hoc modo regimen: diminuta est eius habitudo: et convaluit.

17 (XIII) Filius anohoc monoculus passus est deteriorem et maligniorem speciem emitritei: que erat multe acuitatis: et cronicata est: et medicus eius assuescebat dare ei trociscos de spodio: et consului ei quod acciperet ptisanam per duas horas post sirupum acetosum: et quod tardaret cibum suum quolibet die quousque esset alleviatus a febre: et quod hora parosismi provocaret vomitum: et cum regulatus est isto regimine satis fuit visum sibi difficile: et petebat melius et aliud regimen. Dixique ei ignoro pro te melius et convenientius regimen: et discessi ab eius cura: et post decem dies inveni ipsum ambulantem per villam: et dixit mihi magister auxilio dei et vestri sum liberatus omnino.

18 (XIV) Habuabdalla hoc est servus dei credencerius soldani et aurifaber passus est garap id est apostema stillatum fistulatum in angulo oculi: et dicitur garap ad similitudinem illius vasis de cortice arboris vel corio factum ex quo hauritur aqua et habet aliqua foramina ex quibus fluit aqua: ita habet foramen illud apostema ex quo fluit sanies: consului ei ponere scief in angulo oculi: et fecit hoc: et liberatus est: et ego cognovi quod non erat complete liberatus: licet fistula esset extenuata et desiccata: non tamen consolidata: et multotiens fui hanc medicinam expertus: et motus fui ad faciendum scief.

19 (XV) Verba que inveni in libro Galeni [20] de mirabilibus vel de proverbiis.[21] Quedam magna domina uxor lahadune lupus fratris chaydata patiebatur morbum calidum: et omni die mittebat mihi urinam: et aliquando vir suus personaliter veniebat: et ego manda-

[20] Ed. "G."

[21] This sentence belongs to the preceding case; cf. Meyerhof, *l. c.*, p. 340.

bam per ipsum fieri necessarium sibi conveniens: et post aliquos dies intellexi per eius nuntium quod passa est dolorem in eius uberibus: et apostemata sunt: et prohibui omnino appositionem rerum frigidarum: et sibi iniunxi fieri fricationem: quia illa derivatio erat signum alicuius future crisis: quia ex eo incepit utcunque morbus alleviari: et pronosticatus sum quod si dolor subito cessabat evacuatione non precedente morbus revertebatur: et mee opinionis fuit quod domina declinavit ad quietem et infrigidationem: et cessavit dolor: et apostema: et rediit morbus: et permixtio acutior et vehementior quam fuerat: et cum rediit ad meum consilium feci ipsam uti rebus extinguentibus et infrigidantibus: et purgavi ipsam: et liberata est.

20 (XVI) Alchaseyn hostiarius incidit uno die subito in morbum vehementem calidum: et habebat epar plurimum naturaliter calidum: et in continenti fluxit superfluitas ab eius manus et pedes: putrefacta est: et hac de causa cessavit febris: et aliquis medicorum fecit eum flobothomari: et recidivavit in morbum alicuius caliditatis et acuitatis: et fuit dissoluta eius virtus: et post tertium diem mortuus est.

21 (XVII) Mulier quam duxit ad me hyesu ethiminus venditor animalium erat pinguis et multe humiditatis: accidit ei paralisis: et postea epilensia: et signa dispositionis eius erant certa: simplicia: et manifesta: purgavi flegma cum medicinis violentis: et precepi ipsam assiduare tiriacam quattuor rerum: et speciarius in mei absentia exhibuit sibi anacardinum: et fuit liberata mirabili liberatione: et medici mirati sunt multum de hoc.

22 (XVIII) Quidam noster vicinus tinctor et venditor sede qui morabatur in platea olerum fuerat epilenticus a sui pueritia et macilentus: consuluit nos: et cogitavimus quod morbus non esset ex abundantia flegmatis: sed ex melancolia: et fecimus sibi sepe vomitum provocari: et dedimus sibi postea medicinam purgantem melancoliam: et per tres menses preservatus fuit a casu: et vicini contrate venerunt regratiari nobis de eo quod fecimus: demum comedit pisces: et bibit multum vinum: et illo sero passus est casum: et rediit ad curas quas sibi feceramus: et semper usus est eis: et liberatus est: et donec fuimus in civitate baldac nunquam recidivavit in morbum: et in principio morbi consuevit multas facere medicinas in bimaresten: et ex nulla sensit iuvamentum.

23 (XIX) Natiph seu stomaticon epilenticus qui faciebat cartulas de papiro: consuluit me de morbo caduco: et ego totaliter posui intentionem meam in eius morbo: et inveni ambas partes guideg repletas: et facies eius erat vehementis rubedinis et inflationis: et oculi rubei: et corpus eius repletum et carnosum: et precipi cuidam medico occidentali quod flebothomaret ipsum de saphena: et medicus flobothomavit eum de basilica: et extraxit multum sanguinem: et illo anno non fuit passus epilensiam.

24 (XX) Venit coram me quidam magnus ebrius: qui cum esset uno die plurimum crapulatus: vomuit in quantitate duorum rotulorum sanguinis: et inveni oculos eius rubicundos: et corpus repletum: tunc mandavi quod flebothomaretur: et uteretur rebus stipticis: et liberatus est.

25 (XXI) Fuit vir quidam screans sanguinem cum tussi: et fuerat hoc passus longo tempore: et comedit aliquo die passeres frixos cum oleo: et post screavit rotulos tres sanguinis similis sanguini educti cum sigia maiori: et ego dubitavi de hoc: et sanatus est: quamquam sibi remanserit parum tussis: et precepi ipsum cibari semper piscibus recentibus: et cessaverunt tussis et screatus sanguinis.

26 (XXII) Vir quidam satis dives et de genere ducum incepit pati alopeciam in capite: et ceciderunt de capillis in quantitate duorum digitorum: et venit ad me: et precepi quod fricaretur locus cum panno aspero usquequo esset rubificatus: deinde fricavi ipsum cum cepis: et feci sibi hanc curam pluries reiterari donec ampulatus esset locus: et mandavi ipsum liniri cum adipe galline ad mitigandum fervorem: et cessavit: et spatio unius mensis orti sunt capilli nigri pulchri et spissi: et meliores prioribus.

27 (XXIII) Uxor ablutoris pannorum pro curis filii seyt filii abdalla habebat signa ydropisis: et impossibile erat scire causas eius eventus: quia mulier non videbatur: et precepi quod aliquo tempore uteretur dyatrion pipereon: et aliquo dyacurcume: et quodam die abluebat pannos extra clausam cum viro suo: et cum inclinarunt se supra vas plenum aqua ad abluendum: defecit pes suus: et cecidit: et emisit per vulvam quantitatem viginti rotulorum aque crocee: et alleviata est: et ultimo convaluit: et post longum tempus incepit inflari: et ego quesivi de omnibus circunstantiis eius: et inveni quod

morbus eius erat in matrice: et ipsa opinabatur quod esset pregnans: et non fuit.

28 (XXV) Venit coram me mulier quedam urinans urinam nigram sicut muri: et conquerebatur de dolore lumborum: et cum incipiebat urinare talem urinam cessabat dolor: et post incidit in febrem nocturnam cum rigore: et erat complexionis melancolice: et curavi ipsam cum rebus provocantibus urinam: et liberata est.

29 (XXVI) Uxor filii iesu patiebatur aliquid colice: dedi ei ad sumendum de electuario schahanahazet: et post illud exhibui ei farmacum multe caliditatis: et sentiebat dolorem in matrice: et propter apostema quod erat in matrice ortum: intestinum orobum coartabatur et desiccabatur: et ex hoc erat non modicum constipatum: et dolor augmentabatur cum stercus debebat egredi: et natura conabatur ipsum expellere et non poterat: et cum incepi sibi has medicinas exhibere: visum fuit quod appareret in vulva aliquid simile secundine: et iussi tunc obstetrici quod tangeret quod apparuit: et diceret duritiem eius et cuius tactus erat: et dixit quod erat molle et insensibile: mandavi ei quod ligaret ipsum cum crure: et post duos dies precepi quod incideretur totum id quod erat insensibile: et ter idem apparuit: et similiter fuit ligatum vicissim: et liberata est.

30 (XXVII) Quidam senex vicinus meus ptisicus semper screabat multum sanguinem: et per longum tempus: cum morbus multum crevit fuerunt sibi exhibiti trocisci prohibentes tussim: et fuit morbus mitigatus: et eger per dies aliquos liberatus: et demum mortuus est: non tamen fuerat diebus sui morbi in cura mea: et ideo necessarium est non dare prohibentia screatum: nisi prius quod fluit a capite restringatur: et non emplastres nec inungas corpus habens blactias variolas et morbillum: quia ob hoc anhelitus subito restringeretur: et acquiritur fluxus malignus et urina sanguinea: sicut accidit filio seuhede.

31 (XXVIII) Alchasem probus patiebatur aliquem morbum: de quo dubitabatur in principio quod esset pleuresis: sed postea fuit certum: et non fuit flebothomatus: et urina eius erat rubicunda: et screatus spumosus et albus: et extremitates eius frigide ut nix: et nunquam calefiebant: et ante istud non videbatur quod pateretur febrem: sed corpus apparebat semper frigidum: et oculi eius erant

immobiles: et nihil ego sciveram de morbo suo usque ad nonum diem: et querebat flobothomari illo die: et cum tetigi suum pulsum inveni ipsum debilem et submersum: et tunc prohibui flobothomiam: et eius screatus erat viscosus ut dicitur in pericon pronosticatus sum quod vivet per aliquos dies: et mortuus est illo die post octo horas.

32 (XXX) Quidam de magnatibus baldac patiebatur dolorem sciaticum: medicus suus exhibuit sibi pillulas fetidas et de scetaragi: quia urina eius erat alba: corpus eius plectoricum: et usus fuerat grosso regimine: et ex hac cura augmentatus et fortificatus est morbus: ita quod non poterat sedere nec movere se: fuit clisterizatus: et ob hoc aditum est ad morbi malitiam: tunc me consuluit et meum imploravit auxilium: provocavi sibi vomitum pluries post repletionem: et post hoc emplastravi sciaticam cum sinapi usquequo locus fuerit ampullatus: et ex hoc dolor est mitigatus et aleviatus: deinde clisterizavi eum cum clisteribus acutis usque ad disinteriam: et liberatus est.

33 (XXXI) Soror cuiusdam facientis cartas bombacinas patiebatur dolorem anche et vene sciatice: et querebat sumere medicinam laxativam: et ego feci ipsam clisterizari cum aqua piscium salitorium: et ex hoc provocata est disinteria: et liberata est.

34 (XXXII) Filius significatoris claudicabat propter sciaticam: et noluit clisterizari: sumpsit tamen sepe de pulpa coloquintide [22] et liberatus est.

Explicit libellus Rasis de mirabilibus que ei acciderunt in medicina.

[22] Ed. "coloquin."

A MEDIEVAL PICTURE OF THE HÔTEL-DIEU OF PARIS

DOROTHY MACKAY QUYNN

Contemporary pictures of the medieval Hôtel-Dieu of Paris are extremely rare. An interesting manuscript of the year 1482 or a little earlier, the *Livre de Vie Active* by Jehan Henry,[1] contains a number of illuminations depicting interiors. It has also an exterior view of the hospital, but this is a composite picture showing hospital activities, with no attempt to portray the building itself (see figure 1). Except for this, the earliest pictures known to scholars who have worked in the field are two engravings in the Musée Carnavalet in Paris, one by Van Merlen, of the Place du Parvis Notre Dame, and the other by Israel Sylvestre, showing a part of the Hôtel-Dieu, both done about 1650.[2]

It is therefore of great interest to medievalists to find in this country a painting showing the chapel of the Hôtel-Dieu more than one hundred fifty years earlier than the engravings mentioned above, and hence the earliest representation of the building now known. The picture is one of two panels attributed to the Master of Saint Giles which turned up in the Bournonville sale in 1883. The panel showing the Hôtel-Dieu is known as the *Conversion of an Arian* (see figure 2), its companion being the *Baptism of Clovis*. They are now in the Wildenstein Galleries in New York. Both pictures have been studied

[1] Jehan Henry was Canon and Cantor of Notre Dame de Paris, and one of the administrators of the Hospital. The illuminated manuscript of this unpublished work is in the Archives de l'Assistance Publique in Paris, *MS 6369*. There is an inferior copy of the same work, in the hand of the early sixteenth century, in the Bibliothèque Sainte-Geneviève, *MS 1491*. Although listed in catalogues, these two manuscripts had not been recognized as identical.

[2] These are reproduced in Hoffbauer, *Paris à travers les âges*, I, *Livraison Notre Dame* (Paris, 1882), 51, 54; and by Fosseyeux, *L'Hôtel-Dieu de Paris* (Paris, 1912), plates 1 and 3. The rarity of views of the Hôtel-Dieu is discussed by Coyecque, *L'Hôtel-Dieu de Paris au moyen âge*, I (Paris, 1891), 170; and by Fosseyeux, *op. cit.*, p. xxxiii-xxxv.

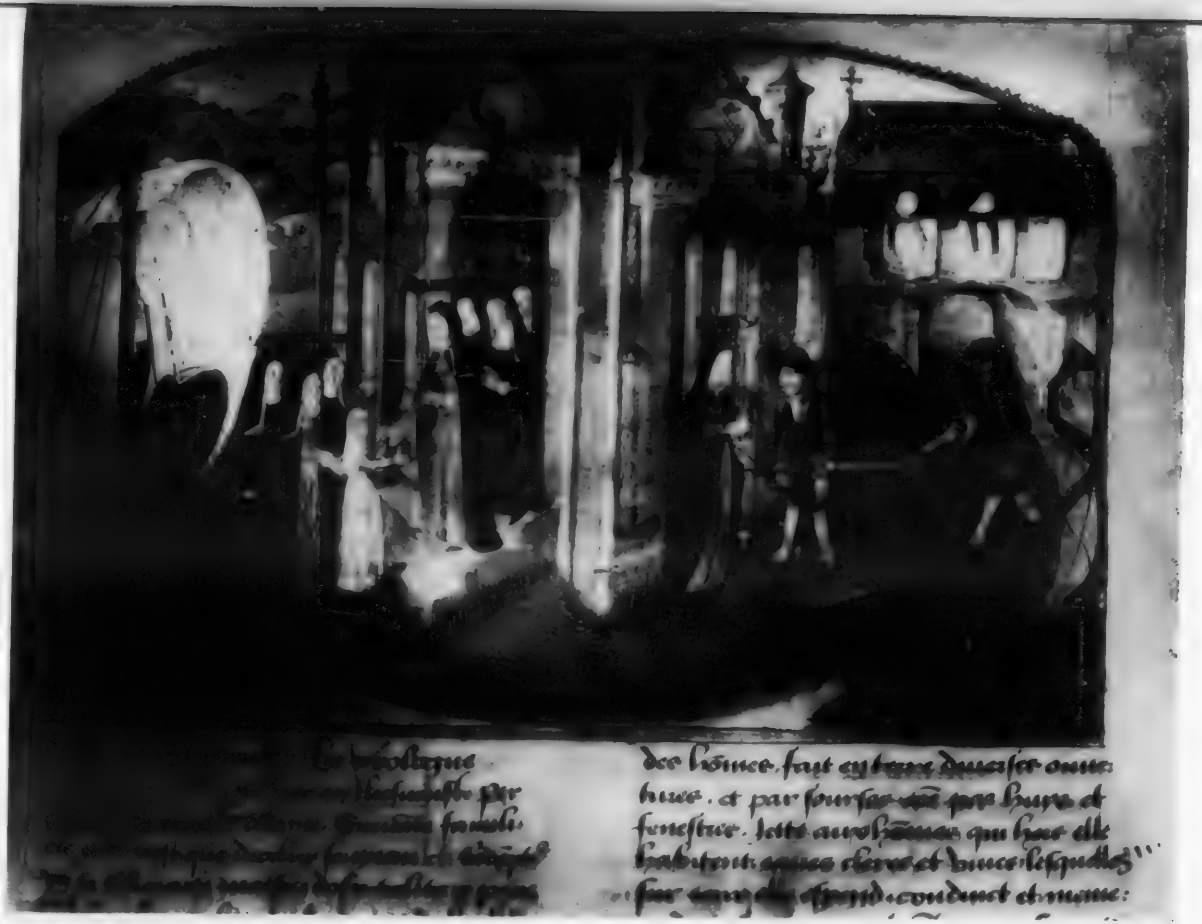

Fig. 1.

A composite picture of the exterior of the Hôtel-Dieu, showing the reception of a Novice, the work of the laundry, and the admission of a patient rescued from a ship-wreck. (Illumination heading the Prologue of the *Livre de Vie Active*, Archives de de l'Assistance Publique, Paris, *MS 1491, fol. 1r.*)

Fig. 2.

Conversion of an Arian (Attributed to the Master of St. Giles).

Courtesy of the Wildenstein Gallaries, New York City.

The scene is the Place du Parvis Notre Dame with a view across the Seine and up the hill to the church of the Monastery of Sainte-Geneviève, near the present church of Saint-Etienne-du-Mont. In the foreground on the left are the Cathedral of Notre Dame and its former baptistry, Saint-Jean-le-Rond. To the right are the buildings of the Hôtel-Dieu, especially the chapel built in the late fourteenth century. The medieval Hôtel-Dieu was on the south side of the Parvis, where the park and statue of Charlemagne now replace it. The present Hôtel-Dieu is opposite the old site, on the north side of the Place du Parvis.

by Julius Held and Max Friedlander,[3] and are reproduced by Louis Réau in his *French Painting of the XIV, XV, and XVI Centuries.*[4]

It is a remarkable coincidence that the painting should prove to be almost, if not exactly contemporary with the *Livre de Vie Active,* the only known medieval description of the Hôtel-Dieu. The lay costumes in the illuminations of this manuscript duplicate almost exactly those of the painting by the Master of Saint Giles. The costumes in the painting show that it was done prior to 1490 or thereabouts,[5] and those of the *Livre de Vie Active* can be dated 1482 or earlier.[6]

The *Conversion of an Arian* shows a part of the façade of Notre Dame de Paris, just beyond the little church of Saint-Jean-le-Rond, its baptistry. To the right is the Hôtel-Dieu, and between the Cathedral and the hospital one looks across the Seine and up the hill still called Mont-Sainte-Geneviève to the tower of the Abbey Church.[7] The low wall at the top of the river bank,[8] just behind the Hôtel-Dieu, can easily be seen on the map of Paris by Truschet and Hoyau (circa 1550). The location of the tower of the Abbey Church can

[3] Julius Held, "Zwei Ansichten von Paris beim Meister des Heiligen Agidius," in *Jahrbuch der Preusszischen Kunstsammlungen,* LIII (1932), Heft 1, p. 3-13; Max Friedlander, "Le Maitre de Saint-Gilles," in *Gazette des Beaux Arts* (1937), p. 221-231.

[4] Paris, 1939.

[5] I am indebted to Dr. Dorothy Miner of the Walters Art Gallery, Baltimore, for advice about the costumes and some architectural details of the painting.

[6] The author died in February, 1484. Internal evidence shows that the document was written shortly before this time.

[7] Held thinks that although the tower looks like that of Sainte-Geneviève the direction is such as to suggest instead the church of Saint-Jean-de-Latran. It is my contention that any modern map of Paris, as well as the picturesque one by Truschet and Hoyau (circa 1550), make it clear that a line drawn from the Parvis Notre Dame between the Hôtel-Dieu and the Episcopal Palace, and thence across the river to the University quarter, would come directly to the Abbey Church. By no possible means could a straight line extend between the Hôtel-Dieu and the Episcopal Palace, and across the Seine, and reach Saint-Jean-de-Latran. No early representations or later remains of this church bear any resemblance to the tower in the painting. Cf. figure 3, and Hoffbauer, *Paris à travers les âges,* II, Livraison Petit Chatelet et Université, p. 12-13.

[8] This wall was taken down in 1666 to make room for book-stalls. (*Délibérations de l'ancien bureau de l'Hôtel-Dieu,* June 9, 1666. Printed in Brièle, *Documents pour servir à l'histoire des hôpitaux de Paris,* I (1881), p. 177.

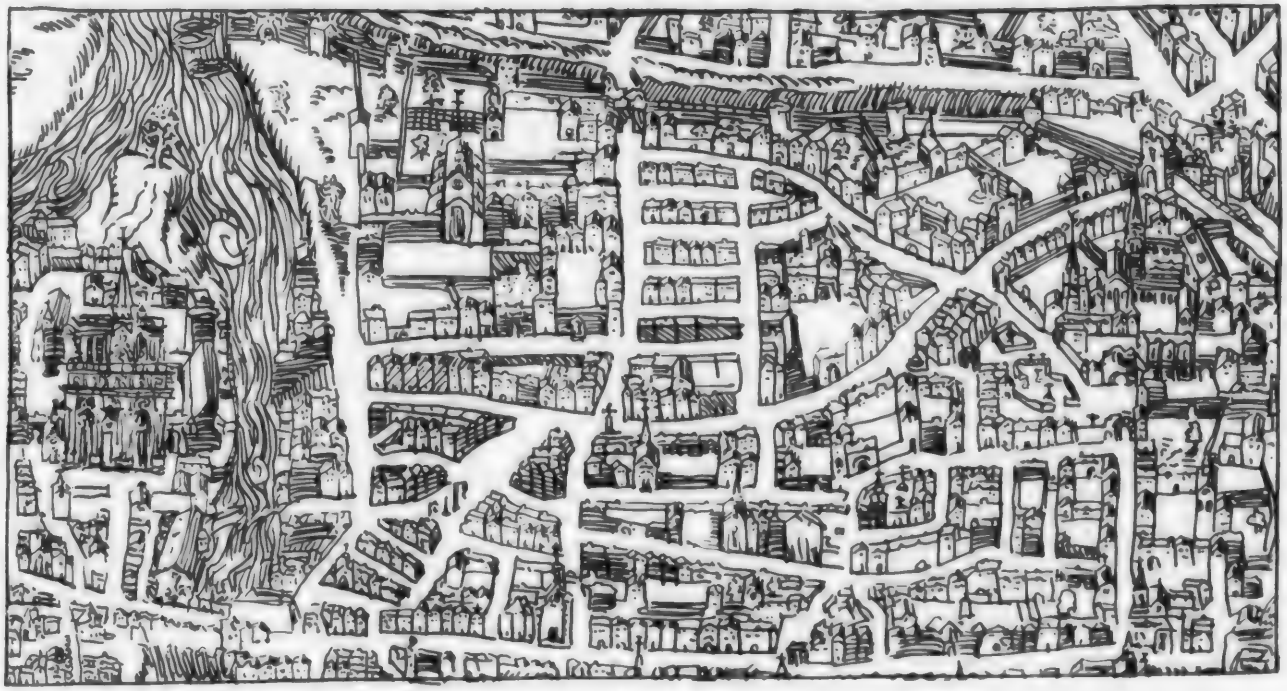

Fig. 3.

Sketch of a section of the map of Paris by Truschet and Hoyau (circa 1550), original in Bibliothèque de la Ville de Paris. Sketch shows Notre Dame and the Hôtel-Dieu to the left, the Monastery of Sainte-Geneviève to the right, and the church of Saint-Jean-de-Latran in the lower center. The long street at the bottom of the drawing is the rue Saint-Jacques.

also be identified on this map. The tower itself has a somewhat different appearance. The painting shows the old tower before it was struck by lightning in 1483,[9] while the map shows the tower restored in the early sixteenth century.

Three sections of the Hôtel-Dieu are visible in the painting, at least in part, the choir, often called the chapel, a small section of the old church to the right of it, and the taller building with two gables to the left and behind the choir.

The church of the Hôtel-Dieu, which served also as the main entrance to the hospital from the Parvis Notre Dame, was a high building with a common gable roof sloping back from the street. It was probably built at the end of the twelfth century.[10] Only the east end is visible in the painting.

Much more conspicuous is the choir or chapel added to the church at the end of the fourteenth century. In the course of this century a house known as the Maison du Plomb had been acquired by the Hôtel-Dieu and it was torn down about 1383 to make room for an addition to the church. The new chapel was completed and dedicated to Saint John the Evangelist in the year 1394.[11] The expense of its construction was borne by a rich Parisian, Oudart de Maucreux, in whose memory a brass plate was placed on the wall. The inscription read as follows:[12]

[9] Bernard de Mandrot (ed.), *Journal de Jean de Roye, connu sous le nom de Chronique Scandaleuse* (Paris, 1896, *Société de l'Histoire de France*), II, 133. "Et, le vendredi vii[e] jour dudit mois de juing, environ l'eure d'entre huit et neuf heures du soir, se leva grant tonnoirre oudit lieu de Paris. Et à ung des esclatz dudit tonnoirre qui fut a ladicte heure vint icelluy tonnoire enflamber et mettre le feu au clochier de madame Saincte-Genevieſve au Mont de Paris, lequel brulla toute la charpenterie dudit clochier, qui estoit demourée par l'espasse de neuf cens ans, fondit toutes les cloches dudit clochier et le plomb dont il estoit couvert, où il y avoit par estimacion cent mil livres de plomb et plus, et y eut ung grant dommaige, qui estoit pitié à veoir."

[10] Coyecque, I, 159.

[11] Coyecque, I, 166; Departement de la Seine, *Archives hospitalières antérieures à 1790: Hôtel-Dieu* (Paris, 1882), I, no. 4131, 4135.

[12] Jacques du Breul, *Le théâtre des antiquités de Paris* . . . (Paris, 1612), p. 74. The spelling has doubtless been modified in this version. The brass plate was still in place in 1754. (Lebeuf, *Histoire de la ville et de tout le diocèse de Paris* [Paris, 1754], I, 28). The date of its disappearance is unknown.

Oudart de Maucreux du surnom
Changeur, homme de bon renom
Et Bourgeois de Paris, iadis
Que Dieu mette en son Paradis
A faict faire ceste Chapelle
En cet Hostel Dieu bonne et belle
Bien aornee de verrieres
Et est aornee de chyaires
Et plusieurs aultres biens notables
Lesquels Dieux ait pour agreables
Et avec quarante quatre
Livres, treize soulds, et quatre
Deniers parisis de annuelle
Rente a tousiours perpetuelle
A lessie en Paris assise
A emploier par bonne guise
Par le Chevecier de cest lieu
Pour vestir pour l'amour de Dieu
Prestres et Clercs faisant l'Office
En l'Hostel et divin service . . .

It was this chapel which the author of the *Livre de Vie Active* described: [13]

du coste devers la sacree maison ung petit lieu en forme de chappelle si nect, si poly, et si bien orne de precieux ornemens que tous ceulx qui passoient a la seulle inspection du lieu estoient excites a devocion. En iceluy ouy une si tresdoulce melodie de personnes angeliques vestus dabits blancs que nuyt et jour chantoient cantiques, hymnes et aultres louenges divines que mieulx sembloit estre lieu celste que terrestre. . . . Aussi oraison vocale qui assiste a ceste entree de maison dieu souvent esiouist les malades de son doulx chant et melodieuse armonie tellement que mainte foiz leurs douleurs de maladie en treoublien . . . et ne les sentent point ainsi que faisoit le melodieux son du psalterium de david a saul quand le mauvais esperit le vexoit et troubloit.

The third section of the hospital, the building with the two gables, contained a chapter room. It is on the site of the Maison de la Fleur-de-Lys, which had been torn down in 1399 to make room for the new section of the hospital.[14]

[13] Archives de l'Assistance Publique, *MS 6369, fol. 47r (cap. vii)*; Bibliothèque de Sainte-Geneviève, *MS 1491, fol. 119r.*

[14] Coyecque, *op. cit.*, II (*Déliberations du chapitre de Notre Dame de Paris relatives à l'Hôtel-Dieu*), p. 35-36. (Items 153, 156, 161).

An examination of the painting permits us to correct errors made in reconstructions of the medieval Place du Parvis and Hôtel-Dieu. In the absence of such contemporary evidence as the painting now supplies, these studies were based on isolated information in contemporary records and on drawings made in the seventeenth century

Fig. 4.

Drawing based on the engraving by Israel Sylvestre, showing the Hôtel-Dieu in 1650. Original in the Musée Carnavalet, Paris.

or later. In these reconstructions, the chapel of Oudart de Maucreux is represented with fair accuracy, possibly because it survived until the eighteenth century without changing much in appearance. The reconstruction by Hoffbauer shows an enormous statue of a bishop above the corner of the roof nearest the Cathedral. This, we learn from the Master of Saint Giles, is incorrect. There was a statue of the Virgin at that corner, but it did not tower above the building. It was in a small niche in the wall, as can easily be seen from the painting, as well as in Sylvestre's drawing.

Other errors were made in the reconstructions of the roof. The painting shows that the old church had a common gable roof, with a pediment at the east, and presumably at both ends.[15] This also appears in Sylvestre's drawing. Hoffbauer's reconstruction shows a roof sloping from the four sides of the church towards a tower in the center,[16]

Fig. 5.

Hoffbauer's reconstruction of the Hôtel-Dieu and adjacent buildings in the fifteenth century. (Hoffbauer, *Paris à travers les âges*, I, Livraison Notre Dame, p. 46)

but the flat roof over the choir or chapel is retained. In the reconstruction by Viollet-le-Duc, the old church and new chapel are combined under one roof, of the type shown in Hoffbauer's drawing.

[15] The length of the ridge pole was thus equal to the length of the long sides of the building.

[16] The length of the ridge pole is in this case less than the length of the long sides of the church. The sections of the roof are quadrilateral but not rectangular as in the correct version.

The third building, which contained the chapter room, is also incorrect in Hoffbauer's reconstruction. It was two complete stories high, with a low third story and a roof with two gables above. The reconstruction shows a lower, more ornate building with three gables.

Fig. 6.

Viollet-le-Duc's reconstruction of the Hôtel-Dieu in the fifteenth century. (Husson, *Histoire des Hôpitaux*.)

In the painting there are no windows except in the gables. The reconstruction shows three windows on the lower floor.

Reconstructions of the Parvis Notre Dame sometimes show two things not visible in the painting. A series of covered stalls is often placed in front of the Hôtel-Dieu, against its wall, the kind of thing one sees today along the quais. These are plainly visible in Sylvestre's drawing, and they were undoubtedly there in the seventeenth century.

But the painting proves that they had not yet been built in the fifteenth. The other noticeable omission from the painting is the famous unidentified statue known as the *Jeusneur* (see figures 5 and 7). Supposedly there from time immemorial, it is always shown in reconstructions of the Place du Parvis. It is possible that its

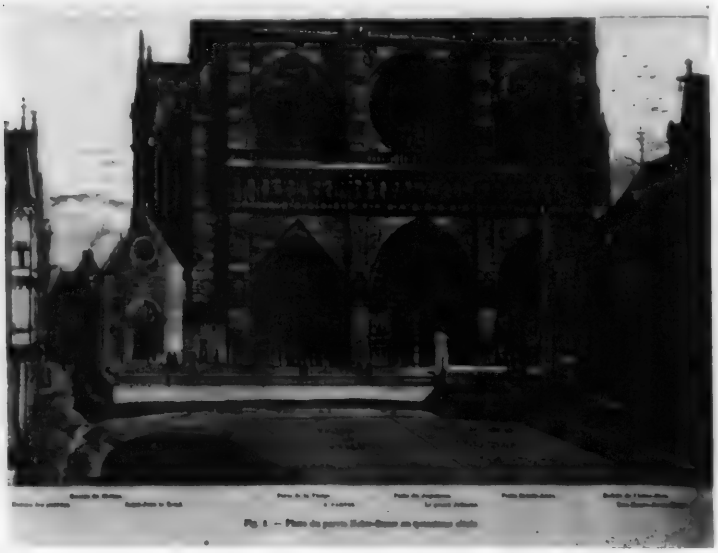

Fig. 7.
Hoffbauer's reconstruction of the Place du Parvis in the fifteenth century.
(Hoffbauer, *Paris à travers les âges*, I, Livraison Notre Dame, p. 1.)

location lies just out of the field covered by the painting,—otherwise it was not in existence at the end of the fifteenth century and is therefore not as old as has been supposed.

The painting attributed to the Master of Saint Giles gives us a picture of the Hôtel-Dieu as it appeared from the opposite side of the Parvis, in front of Notre Dame. It makes it live for us as no reconstruction can, for the crowd of people in front of the Cathedral, and the view of a part of the Left Bank across the Seine place it in its true setting in the life of fifteenth century Paris.

Andreas Vesalius in His Anatomical Cabinet
Edouard Hamman — 1848

THE FAMOUS HAMMAN PAINTING OF ANDREAS VESALIUS

FRANK NORMAN LOW
University of North Carolina

The oil painting by Hamman, Andreas Vesalius in his anatomical cabinet, is well known to all anatomists and many physicians. However, the story of this painting, its inception and history, and the present location of the original, is generally unknown. Knowledge that it hangs in Stimson Hall, the former Cornell Medical School Building, in Ithaca, New York, led the author to investigate its story and to learn something of the artist whose efforts created this well known painting.

The artist, Edouard Jean Conrad Hamman, was born in Ostend, Belgium, on the 24th of September, 1819. He became a pupil of Keysers at the Künstlerakademie in Antwerp, first exhibiting in Brussels in 1842. Later, in 1846, he took residence in Paris. There his work came under the influence of L. Gallaits, Robert-Fleury, and Theodore Couture. He lived and painted in Paris for many years, dying there on March 31, 1888.

Historical subjects were the favorite theme of Hamman, almost all of his paintings depicting historical characters in situations typifying their lives and accomplishments. In his work he shunned bright colors, seeking to achieve dramatic quality by appropriate use of light and shade. His effects have been said to have been gained by the use of "picturesque chiaroscuro." (1)

The signature, EDOUARD HAMMAN, 1848, on the lower left hand corner of the painting here considered sets the date of the completion of the work. It was first displayed to the public in the Brussels exhibition of that year. (1) This was two years after Hamman had taken residence in Paris and only one year following the erection of a bronze statue of Vesalius by Joseph Geefs in Brussels, the birthplace of Vesalius. Since Hamman was clearly familiar with the art life of Brussels it may be surmised that this bronze suggested another commemoration of Vesalius, resulting in the present picture. Its exhibi-

tion in Brussels at this particular time was especially favorable to its reception. Appearing, as it did, in Vesalius' birthplace only one year after he had been commemorated by Geefs' bronze, it could hardly fail to attract favorable notice. It became popular immediately, contributing more to the fame of the artist than any other of his works Years later, in Hamman's death notice, he is described as the artist who painted the tableau of Vesalius.(2)

The painting is on record (3) as having passed immediately into the private collection of a " picture-lover " of Rotterdam. However, in its early years it must have been available to copyists, since reproductions appeared as early as 1850. The first and best known representation was a lithograph by Mouilleron, one of the best lithographers of his day. This lithograph was widely circulated and was chiefly responsible for the great general popularity of the picture. It has been lithographed on two other occasions, once by Milster in folio size, and once by J. S. Schubert. One wood engraving has been made by F. Wiesener and another has appeared in a volume on the history of anatomical illustration by Dr. Choulant.(4)

The various reproductions which have appeared are all reduced in size, the original canvas measuring 79½ by 99½ centimeters inside the frame. It is worth noting that the above mentioned reproductions are mirror images of the original. So consistent has been this mirror imaging that Spielmann (3) in a volume devoted to the iconography of Andreas Vesalius, has described the figure of Vesalius with an erroneous reversal of the right and left hands. In the plate accompanying this article, taken from a photograph of the original,[1] the relations are properly presented.

The early history of the picture is unknown to the author who has been unable to identify the " picture lover " of Rotterdam who first purchased it. However, it was later acquired by Andrew Dickson White, the first president of Cornell University, for his private collection. This occurred during his European travels, probably prior to 1880. It remained in his collection in Ithaca, New York until 1895, when its somewhat gruesome appearance gave rise to the ques-

[1] Grateful acknowledgment is made to Dr. H. B. Adelmann of the Zoology department, Cornell University, who supplied the photograph.

tion of its fitness for home decoration. Mr. White requested that the university librarian find a suitable place for it. Accordingly, it was hung in the library of Cornell University, but there was again objection to its appearance. Professor Simon Henry Gage was consulted and gladly offered the picture a home in Stimson Hall where it has been on prominent display ever since. It is labeled, "Andreas Vesalius (who first, against much opposition, revealed through dissection the true structure of the human body) by Hamann.[2] Presented to Cornell University by Andrew D. White, 1895."

The original has been incorrectly stated (1) to be in the Marseilles museum. This is doubtless a confusion with a later study of Vesalius painted by Hamman in 1859 and called "Andreas Vesalius at Padua in 1546." A much larger painting, it represents the anatomist about to make a demonstration dissection in a large amphitheater. It is in the municipal collection in the Palais de Longchamp in Marseilles. The authenticity of the Cornell painting is supported by the statement of Andrew D. White (5), "The original painting of Vesalius at work in his cell, by Hamann,[2] is now at Cornell University." Two blemishes on the canvas, visible in the photograph, one in the upper left hand corner, and the other in the lower left hand corner of the window pane, are discernable in the Milster lithograph, an early reproduction. This tends to confirm the statement of Dr. White.

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[2] A mis-spelling, also to be found in Dr. White's history (5).

DR. JABEZ H. ELLIOTT

President of the American Association of the History of Medicine 1942-1943.

PREFACE

Recognizing the importance of keeping the cultural life of the nation alive during this period of war, the American Association of the History of Medicine has continued all its activities in spite of growing difficulties. The number of members called to the armed forces is increasing rapidly. Some expressed the desire to maintain their membership, others resigned, but the Council of the Association decided to relieve members in the active service from all dues and obligations for the duration of the war, to keep them on the inactive list, and to restore them automatically to active membership after the war.

Thus we have not only maintained our membership but have even increased it slightly in spite of the fact that the Association lost 13 members through death from January 1, 1941 to May 1, 1942. Memoirs of those who had been particularly active in medical history were to be published in this volume. Unfortunately the manuscripts could not be secured in time, but the memoirs will be included in next year's volume.

The *Eighteenth Annual Meeting* had a very full program and all papers announced were read. The meeting commemorated with a symposium the three hundredth anniversary of the death of Galileo and with a lecture the one hundredth anniversary of the first application of ether anaesthesia by Crawford W. Long. Dr. Francis R. Packard, editor of the *Annals of Medical History*, delivered the annual Fielding H. Garrison lecture and the William Osler Medal was awarded for the first time. It went to Mr. John T. Barrett of Boston University School of Medicine in recognition of his essay "The Inoculation Controversy in Puritan New England." The essay is included in this volume. Dr. Bernhard W. Weinberger of New York exhibited and demonstrated his remarkable collection of pictures and documents on the history of dentistry.

Twelve papers were presented during the two morning sessions. They are published in this volume with the exception of two. Dr. Ernest E. Irons' paper on Théophile Bonet which he read at the

meeting was an abstract from a longer study that had already been accepted for publication in the Bulletin. It is too long to be included in the Transactions but will appear in one of the next numbers of the Bulletin. The other by Dr. Maurice S. Jacobs, "Thomas Beddoes and His Contribution to the Treatment of Tuberculosis" had already been promised to the Annals of Medical History.

The attendance at the various sessions was not quite as large as in the previous year but averaged about 85. In view of the increasing difficulty of transportation, the Council decided not to hold a Fall Meeting this year but to devote next year's Fall Meeting to the commemoration of the four hundredth anniversary of the publication of Vesalius' *Fabrica* and to hold it in New Haven.

I find the reports of our 20 Constituent Societies very impressive. They tell us that over 100 local meetings have been held during the year, devoted entirely to medical history, with over 125 papers. This is an excellent record indeed and shows how firmly established a subject medical history has become in this country.

The war is going to present serious problems with 50,000 physicians in the armed forces and those at home over-burdened with work. Nevertheless I think we must do our utmost to preserve our medico-historical organizations. We may have to cut down the number of meetings. We may have to count with smaller audiences, but we must carry on, not only because it takes years to reconstruct an organization, but—first of all—because history is needed more than ever in a period in which all values are revaluated.

It is interesting and encouraging to find that our young medical students working on an accelerated schedule are more interested in history than ever. The war, by raising so many fundamental problems, has stirred them up. They justly feel that the historical approach may help them to understand the world in which they are called upon to play a very active part as citizens, soldiers and physicians. We must not disappoint them.

HENRY E. SIGERIST
Editor

THE PRESIDENTIAL ADDRESS

ON OBSERVATION AND INTERPRETATION

With Special Reference to Thomas Winterbottom

J. H. ELLIOTT

In the Regimen Sanitatis Salerno published in London in 1575, the translator begins his dedication thus, " To the Right excellent and honorable Wyllyam Paulet, of the order of the Gartir, Knyght lord S. John Erle of Wilshere, Marques of Winchester, and lorde Treasurour of England, Thomas Paynell sendeth greetings. Readyng of olde auctours and stories my most honorable lorde, I fynde that men in time paste were of longer life, and of more prosperous healthe: than they are now a dayes. Which thynge as it greeved me, so in manner it forced me, to seeke the cause of this sodayne and Strange alteration."

Paynell, or as he may appear on the title page, Paynel, then proceeds to discuss his problem and translates the Regimen with much comment, which he feels may guide man along right paths of living. He puts it into plain English that all may read, and understand. He is rediscovering for his own generation the observations attributed to the School of the Hippocratic City five centuries earlier.

To-day " readyng of olde auctors and stories " we are prone to remark that their observations were usually excellent, their theories often wrong. We admire the clinical observations of Hippocrates but do not accept his theories of the imbalance of the four humors as the explanation of the disease and its symptoms—we prefer to talk of endocrine imbalance or of deficiencies and excesses found in our study of blood chemistry.

Some clinicians have achieved greatness as did Thomas Sydenham through careful observation of the course of disease and of the symptoms presented. He preferred to describe a disease and study its natural bent and inclination, as a naturalist to-day prefers to make measurements, observe life habits, life history, the effects of environment rather than theorize upon origins. Through this attitude toward

disease Sydenham has left us many classical descriptions not burdened with false theory and philosophy.

Some observations have such accuracy that one may wonder at times why the recorded facts did not lead to a correct interpretation of cause and effect. There is one well known instance to which reference has been made in recent years, Benvenuto Cellini's description of his syphilitic infection and its cure. I quote from Symonds' translation (Brentano's N. Y. 1906 P. 137) of Cellini's Memoirs, written about 1559 and first printed in 1730.

It was true indeed that I had got the sickness; but I believe I caught it from that fine young servant-girl whom I was keeping when my house was robbed. The French disease, for it was that, remained in me more than four months dormant before it showed itself, and then it broke out over my whole body at one instant. It was not like what one commonly observes, but covered my flesh with certain blisters of the size of sixpences, and rose-coloured. The doctors would not call it the French disease, albeit I told them why I thought it was that. I went on treating myself according to their methods, but derived no benefit. At last, then, I resolved on taking the wood, against the advice of the first physicians in Rome;[1] and I took it with the most scrupulous discipline and rules of abstinence that could be thought of; and after a few days, I perceived in me a great amendment. The result was that at the end of fifty days I was cured and sound as a fish in the water.

Some time afterwards I sought to mend my shattered health, and with this in view I betook myself to shooting when the winter came in. That amusement, however, led me to expose myself to wind and water, and to staying out in marsh-lands; so that, after a few days, I fell a hundred times more ill than I had been before. I put myself once more under doctors' orders and attended to their directions, but grew always worse. When the fever fell upon me, I resolved on having recourse again to the wood; but the doctors forbade it, saying that if I took it with the fever on me I should not have a week to live. However, I made my mind up to disobey their orders, observed the same diet as I had formerly adopted, and after drinking the decoction four days, was wholly rid of fever. My health improved enormously; and while I was following this cure, I went on always working at the models of the chalice. I may add that, during the time of that strict abstinence, I produced finer things and of more exquisite invention than at any other period of my life. After fifty days my health was re-established, and I continued with the utmost care to keep it and confirm it. When at last I ventured to relax my rigid diet, I found mysef as wholly free from those infirmities as though I had been born again.

[1] That is, Guaiacum, called by the Italians legno santo.

With the benefit of hindsight, always better than foresight, modern workers in syphilology tell us as Sydenham might have done that the disappearance of Cellini's rose colored rash was not due to the guaiac he used, but that it disappeared as a secondary rash may when untreated, that these later symptoms were due to systemic syphilis, that the high fever he developed living in the marshes of the Campagna was malarial fever, that the complete recovery he ascribed to the further use of guaiac was, we know to-day, the cure of his infection by hyperthermia caused by his malaria infection. This is now quoted as a record of syphilis cured by fever therapy—one of those records writ plainly, yet not read with understanding.

To-night I wish to read to you some selections from a little volume dealing with life in the tropics, a manual of *Medical Directions for the use of Navigators and Settlers in Hot Climates.* Written originally " at Freetown in Sierra Leone for the use of such trading vessels in the service of the Sierra Leone Company as were provided with surgeons," the second edition (London, 1803) presents the directions " to the public under an enlarged form with the hope that thay may become more extensively useful to Europeans, whose pursuits, in hot climates, often lead them into situations where medical assistance cannot be obtained."

The author is Thos. M. Winterbottom (1765-1859), Physician to the Colony of Sierra Leone.

From his remarks on Scurvy we learn something of his wisdom and his knowledge. " It is to the late ingenious Capt. Cook that we are indebted for the most satisfactory proof of the possibility of preserving a ship's company from the attacks of this dreadful disease. The scurvy is universally occasioned by living long upon a diet of putrid or salted meats, with little or no vegetable fo[illegible]nd a scanty allowance of, perhaps, bad water." He then describes the symptoms and objective signs fully and accurately, discusses sanitation, exercise, recreation, and returning to diet urges that on long voyages the meat ration be lessened and a larger proportion of vegetables be used. He advises fresh bread and gives instruction for preserving yeast for two or three years. " Preserved fruits of all kinds will be found highly useful, and grateful accommodation to scorbutic patients, who have an insatiable desire for almost all vegetables, but particularly those of

an acid nature. Green gooseberries may be preserved easily for a year or more by putting them into bottles, and afterward covering them with water made pretty sour with acid of vitriol. A quantity of the juice of lemons or limes, may be preserved for any length of time by adding to the expressed juice about one third the quantity of spirit . . . spruce beer has been already recommended, and will be found particularly useful in preventing the complaint. Vessels going from a northern climate to a southern one, ought to have a good stock of onions, garlick, and flour of mustard and upon their return a quantity of the capicum, or cayenne pepper, when it can be procured will be found equally useful. Medicines are not of much service in this complaint." For the local treatment of ulcers when they break out he advises a poultice of carrot, of yeast, or of meal and stale beer; " but they seldom heal entirely till the patient approach the land, and can procure what he most ardently desires, a supply of fruits and fresh vegetables."

For centuries the world believed in the invisible pores in the interventricular septum, and this was not swept away completely until Harvey's demonstration was accepted. For years the world believed that miasma, or vapours arising from marshes and wet land brought on in some way ill understood, the paroxysms of ague and their resultant effects upon the body.

Many were the challenges to this theory even before Laveran's discovery of the parasite in the red cell of the circulating blood. Manson, as did King and others, made deductions from many observations that the mosquito was the vector of the disease. In 1897 Ross in India proved the mosquito to be the vector of bird malaria (proteosoma). At the 1897 meeting of the British Association for the Advancement of Science in Toronto, W. G. MacCallum a brilliant Toronto graduate in Biology demonstrated on warm slides to Manson, the phenomenon of flagellation and impregnation which led to the solution of the problem of the transmission of malaria.

But who can read the observations made by Winterbottom at this date with the key in one's hand without seeing the hidden truth, even as Dr. Young made clear the hieroglyphs on the Rosetta stone which had defied savants for centuries, or as the cryptic writing of Pepy's Diary was given to the world once the code was made clear.

I have read from this text to my student classes as an example of clear observation, the only key needed is to know the habit of the West African mosquito which except in the hut or between decks, seeks blood only at night, and the first and last hours of daylight, then reading mosquito for miasm or marsh vapour or emanation, it all seems so clear that one wonders why a century was needed to grasp the truth which we see staring us in the face.

First a few selections regarding clothing. Though not stated to guard against mosquito bites he advises, " trowsers reaching to the ancles and fastened by strings or buttons, are most convenient. Where stockings are not worn socks should be used in their stead. The practice of going about without shoes is highly improper. . . . Those who are exposed to the night air should put on additional clothing. It is a very frequent custom with those who have resided long in Africa " to wear only a shirt and trowsers, and in this dress expose themselves at night when the land breeze blows . . . it is a practice by no means to be imitated by new settlers. . . .

" One of the most important means of preserving health in a hot climate is by going early to rest. . . . Early rising, so much recommended in colder countries, does not seem to be attended with the same advantages between the tropics; the coolness of the morning is grateful; but the heavy dews which fall before sunrise, and the thick fog which frequently lies upon the ground till the sun has risen, render the beginning of the day unwholesome. At this time also, the stomach being empty, the body is more liable to be affected by fever, than at any other time of the day; more especially in uncultivated or marshy places. . . . Sailors should be forbidden to sleep upon the decks at nights. . . .

" It was formerly an opinion that the diseases to which settlers in a new country were subject, entirely arose from a change of climate, and therefore could not be prevented. Experience dearly bought has however at length taught us better, and shewn that, in every country, there are some places more sickly than others; and also that the distance is often very small between an unhealthy and a healthy situation. It has also been sufficiently proved, that there are certain causes which in every country, especially in warm climates, will produce fever. The most common, and also the most fatal of these

causes, is the vapour arising from swamps and marshes or spots of ground, partly covered with mud and partly with water. (Though the most common causes of fever in hot climates be the air which blows over marshes, yet when the fever is once introduced among a number of people, it is very apt to become infectious, and spread where the original cause does not reach.) . . . A stranger who goes into the fens of Lincolnshire, or into any of the marshy parts of England, will not long escape an attack of fever, though the inhabitants from custom, find no inconvenience.

" The hotter the season of the year is, the sooner and more severely will his disorder be felt: whereas had he gone there during a severe frost, he would have escaped so long as the cold continued. Great degrees of heat are very seldom the cause of disease. The hottest part of the dry season between the tropics in dry situations, is far from being unhealthy; it is only when moisture is added to the heat, that feverish disorders are produced; and hence it is, that the rainy season proves so dangerous. In low wet situations, the sickness is then greatly increased, the slime and the mud which is left on the banks of rivers, infecting the air with noxious exhalations which few Europeans can bear. Large lakes, though their vicinity is by no means a situation to be chosen, have not such bad effects while full; but as soon as the water becomes so low that the bottom is seen dry in various parts, diseases are astonishingly multiplied.

" Persons living to windward of a marsh or swamp, though at no great distance from it, may enjoy a good state of health; but if they are to leeward of it even at a considerable distance, their situation will certainly prove unhealthy. It is not easy to say at what distance from a swamp the wind which blows over it loses its harmful qualities; we have however reason to suppose the distance is at least a mile. Persons living to leeward of a marsh, and at no great distance have often had their health preserved by trees growing between them and the marsh. In such situations therefore trees should not be cut down; but it is most prudent to avoid such places altogether. The precautions taken by those who live on shore with respect to situation, ought also to be observed in stationing ships.

" It has often happened in fleets lying at anchor off a swampy shore that ships nearest to it have proved very unhealthy; . . . while the

crews of vessels distant from it a mile or more remained in perfect health.

—It has been found very useful when the vessels ride hard to the wind to have a sail stretched across the forepart of the ship, the cooks hearth being placed behind it, as that the smoke may go over the vessel. When the side of the ship is exposed to the wind from the shore, the ports on that side should be kept constantly closed. In such situations also it will be found of much use to smoke the ship frequently between decks: this may be done by burning tobacco, junk, gunpowder etc. in a common iron pot, or by carrying a fire into different parts of the ship: the dampness of the air is thus most effectually destroyed, and to the moisture of the air, we must refer a great part of its harmful effects. The ill consequences of an unhealthy situation are more severely felt by those who pass the night in it: by returning to sleep on board their ships, the men often escape the danger; but if they remain all night on shore however well accommodated with beds, they are very liable to be affected with sickness. The crews of boats employed in wooding or watering, who stay all night on shore, or remain there some time after sunset, are very frequently cut off by fevers. The bad effects of their exposure in an unhealthy country do not always immediately appear; they are sometimes not felt in less than an week or ten days after leaving the place and getting out to sea."

He then describes how in wet weather when the ports are closed, fires ought to be made at different times of the day and the houses well smoked especially the bedrooms.

" The signs of an unhealthy country are great swarms of flies, mosquitoes &c, thick fogs lying on the ground for sometime after sunrise, heavy dews, cold nights succeeding very hot days. Healthy situations are those where the soil is dry and elevated as upon the sides or summit of a hill, at a distance from marshes or stagnating waters . . . the banks of a running river are much more wholesome than standing waters.

. . . In general places open to the sea, bordered by a sandy or gravelly beach, free from slime and ooze, are preferable to all others."

" Those who will take the trouble of attending to the means above recommended for the preservation of health, may probably find them-

selves as little affected with sickness in Africa, or the West Indies, as if they lived in the healthiest parts of Europe."

In Ecclesiasticus (c. 34 V 8. 9) we read,—

> "A well instructed man knoweth many things;
> And he that hath much experience will declare understanding.
> He that hath no experience knoweth few things; but he that hath wandered shall increase his skill."

To-night we have wandered with an observant man, who had great skill in epidemiology, whose instructions and observations may seem to us almost uncanny in the light of our present day knowledge. His interpretation of the phenomena he observed was not ours of to-day, but his preventive medicine based on his observations was dramatically near the truth.

Dr. Francis R. Packard
The Fielding H. Garrison Lecturer.

THE FIELDING H. GARRISON LECTURE

MEDICAL CASE HISTORIES IN A COLONIAL HOSPITAL

FRANCIS R. PACKARD

Foreword

When I was honored with the invitation to deliver The Fielding H. Garrison Lecture I thought I could present nothing more original than a review of the actual case reports of the cases which were treated in an outstanding hospital at the beginning of the last century. They are especially interesting because they are bedside records of the practice of some of the leading physicians and surgeons of the time, and illustrate the conditions they had to treat. The records begin in 1803, a quarter of a century after the Revolution, at a time when the practice of medicine and surgery remained much as it had been in the Colonial period, and they end in 1829, just as the influence of the great French school, Bichat, Laennec and Louis, was beginning to exert its great influence in this country with the return of the young men who had studied under them.

The Pennsylvania Hospital was opened for the reception of patients in 1751 in a house belonging to the estate of Judge Kinsey on High Street, now Market, below Seventh. In 1755 they acquired land between the Seventh and Eighth and Spruce and Pine and erected some of the buildings yet in use. For many years the only records of the cases of patients who were admitted were simply entries in the Managers Minutes that such or such a patient was admitted, with such or such a disease or injury, and was either discharged cured or died, on such or such a date. It was not until 1803 that the Managers ordered that a " record book " should be kept, in which " The Practice of the Physicians is to be inserted in it, and an Index referring to every case is to be introduced at the end of the Volume," . . . which shall be the property of the Contributors (not to be lent out) but, laid before the Managers at every one of their Monthly Meetings."

The first record book of this character which the Hospital still possesses begins in April, 1803, and the last case recorded was admitted in April, 1929.

The notes on the cases were made by the apprentices or by the pupils of the members of the staff. Some of them are initialed or signed by the writer. William Paul Crillon Barton wrote up some of the reports and aside from the initials attached to them they can be identified by the elaborate scroll penmanship with which he decorated the headings of the reports.

The notes on the cases vary greatly. Some are too lengthy and minute, some excel in the clearness with which they bring forth the essential points. As they are seldom signed, except those by W. P. C. Barton and Benjamin H. Coates, the authors are usually anonymous. Some are noteworthy for brevity, notably the latter:

A Case of Luxation of the Humerus.

Discharged, 7th Mo. 6th, 1806, James Black, a poor Labouring man from Lancaster, he had the misfortune to dislocate his Shoulder by an accident on the seventh of the fifth month last and remained in that distressed situation until this day when his shoulder was happily reduced to its proper place by Dr. Physick, and the patient discharged cured.

For many years the members of the Staff of the Hospital were all elected "Physicians to the Hospital," there being no distinction made between the physicians and surgeons. It is evident, however, from the records in this book that some of the staff were assigned the surgical work by the mutual consent of their colleagues, and others the medical. Thus in the records we are about to consider we find the medical cases were chiefly treated by Dr. Rush or Dr. Coxe, the surgical cases by Drs. Physick, Wistar and Dorsey. The first official recognition of a distinction of the duties of the Staff was made by the Managers in 1810, when Dr. Thomas Chalkley James was appointed Physician to the Lying-in Department. In 1821 the distinction between physicians and surgeons was officially recognized when Dr. Hartshorne resigned. A Minute records that Dr. William Price was transferred "from the Medical to the Surgical Department" to fill the vacancy caused by Dr. Hartshorne's resignation.

At the annual election of the Staff in 1823, its members were first officially divided, the election being recorded as follow :

Physicians, John C. Otto, John W. Moore, Samuel Emlen.
Surgeons, Joseph Parrish, Thomas T. Hewson, John Rhea Barton.
Physicians for the Lying-in Department, Thomas C. James, John Moore.

Apprentices and Resident Physicians

The members of the Staff were permitted to bring their private pupils to the Hospital, and they utilized the services of these young men as assistants in their work. This condition of affairs prevailed until 1773 when the Managers began to take apprentices to the Hospital who lived in the institution and performed the usual duties of a resident physician. After serving an apprenticeship of five years the Hospital granted them a handsomely engraved certificate to that effect.

In 1824 the Managers finally adopted a rule abolishing the apprenticeship system and requiring all future resident physician to have a medical degree.

The Record Book, 1803-1829

During the period from 1803 to 1829 the Hospital had some very distinguished men on its staff. Dr. William Shippen, Jr., had resigned in 1802, and his colleagues who had been the founders of the first medical school in the Colonies, John Morgan, had resigned in 1789 and Adam Kuhn in 1798. The senior member of the Staff of the Hospital in 1803 was Benjamin Rush (1745-1813), the only Signer of the Declaration of Independence who possessed the degree of M. D., having graduated at Edinburgh in 1766. Rush was first professor of chemistry in the College of Philadelphia, and later professor of the theory and practice of medicine in the University of Pennsylvania. He was elected physician to the Pennsylvania Hospital in 1783 and served in that capacity until his death in 1813.

Rush has been generally recognized as the leader of the medical profession of his day in this country. A man of dominating personality and strong convictions he had his enemies as well as his admirers. During the Revolution he made the great mistake of joining with Washington's detractors in the so-called Conway Cabal, which wished to displace Washington from his position as commander-in-chief and

put General Horatio Gates in his place. With the downfall of the Cabal Rush lost much of his political importance. He was a systematist in his practice, strongly advocating the ideas of Brown, of Edinburgh, and Broussais, simplifying the practice of medicine by classifying all diseases as due either to excitation or depression and, therefore, to be treated by stimulation or depletion. He was sometimes disrespectfully termed the " American Sangrado " because of the excessive bleeding which he firmly advocated. During the yellow fever epidemic of 1793 in Philadelphia, Rush modestly stated in his "Account " that he had treated more patients and with greater success than any other of his colleagues. The treatment to which he attributed this unusual success consisted in bleeding " *ad deliquium animum* " and administering ten grains of calomel and ten grains of jalap every hour. Ruch was an outspoken abolitionist and strongly opposed to the use of tobacco and alcoholic drinks. Because the College of Physicians of Philadelphia of which he was one of the Founders and an officer, had differed from him in an expression of its views on the origin and cause of yellow fever in Philadelphia, Rush resigned from the College, taking with him several of his followers. Philip Syng Physick never became a Fellow of the College of Physicians because of his loyalty to Rush, and joined with others in founding the Philadelphia Medical Society as a rival organization.

Let us take up the records of the medical cases reported in this book as treated by Dr. Rush. They make rather a sorry showing when contrasted with the surgical reports in the volume. In 1801 Dr. Rush treated a case " apparently in the last stages of a Consumption." The report is headed " Salutary Effects of Mercury in Consumption." Dr. Rush ordered him antimonial powder and mercurial ointment applied to the sides and breast. " In a few days he was highly gratified to hear him complain of swelled gums, and great pains in his teeth. From this time his Cough, Fever, Chills and Sweats left him " and some weeks later he was discharged, *cured*.

Dr. Rush was equally successful in two other cases of " pulmonary consumption," though pursuing a somewhat different line of treatment. These cases were reported under the heading " Successful use of Opium, etc., in two cases of Pulmonary Consumption." The treatment consisted in giving what we would now consider enormous

doses of laudanum, combined with " drinks of the most cordial kind, particularly wine and brandy toddy, and animal food to be taken as often and in as large quantities as the stomach would hold." Both patients were discharged *cured.*

A CASE OF DISEASE PRODUCED BY DRINKING COLD WATER, WHICH WAS RELIEVED BY LAUDANUM AND PRESSURE ON THE STOMACH.

Daniel Voles, a young man was admitted into the Pennsylvania Hospital with violent mania and convulsions, produced from drinking cold water. *Symptoms.* When he came to the Hospital he was delirious. He complains much of pain in the Stomach. At intervals it becomes much more severe, particularly a few moments before he was convulsed. When the fit attacked him he threw himself about upon the bed with much violence. His delirium became furious and his convulsions general. His jaws were closed with great force, and his pulse round, full, tense, quick and frequent; about that grade of arterial action which Dr. Rush would call *Synocula.* It presented these characters during the intervals of the fits. When the convulsions came on it became languid, contracted, and weak. It could scarcely be preceived after the convulsions had continued for some time, it lost its violence during the intervals and became more weak. . . . His respiration was much less frequent during the fits, than in the intervals. He could always predict an attack of his convulsions by his sensations. *Treatment.* He was bled on first coming into the house, to the quantity of 1℥xx at two bleedings, in about the interval of an hour. Laudanum was given him in doses of about a half a drachm when his pulse began to sink. Brandy was also administered when the same symptom occurred. These remedies invariably raised the pulse and alleviated the convulsion. . . . For the pain in the stomach a mustard poultice was applied and violent pressure made upon that viscus. . . . The pressure upon the stomach produced the most astonishing effects. As soon as it was completely made, he would rise from the fit perfectly recovered. It was produced by the closed hand applied directly over the stomach. Another local remedy which had been much recommended in the public newspapers, was also tried. It was, to keep the jaws completely opened by means of an instrument contrived for that purpose. They were extended considerably. The effect of this plan was doubtful, we were disposed to conclude that it had but little effect.

The treatment seemed to be proving effectual. The youth fell into a natural sleep, but in a short time the sleep deepened into unconsciousness and his breathing became stertorous, evidently the effect of the laudanum. Now let us see how his medical attendants treated him for opium poisoning: " Apprehensive that the effect of the medicine might be fatal to him, mustard poultices were ordered to be applied to his wrists and ancles (sic). His thighs were rubbed with

spirits of turpentine for twenty minutes, and sinapisms were applied to them. Vinegar was injected into the oesophagus, and an enema of spirits of turpentine and water with gum arabic a. a. given him. About four hours after the above means were used he began to rouse from his sleep. Large quantities of warm water were then administered to him, and a copious vomiting was produced." Seven days after his admission he was discharged " perfectly cured."

Cases of Insanity

Although the petition for a charter for the Hospital stated that one of the objects of the institution was to provide the proper care of " Lunaticks or Persons distempered in Mind and deprived of their rational Faculties," adding their number " hath greatly encreased in this Province," and when the permanent buildings of the Hospital were erected in 1755 cells for this purpose were arranged in the basement, there are but few notes of such cases in the Record Book. Most of these cases were in the care of Dr. Benjamin Rush. One of them is noted in full and illustrates the methods employed by the leading alienist in this country at that time: " D. T. a respectable and worthy citizen of the State of New York, had been deranged in consequence of vexation and disappointment in his political pursuits for three months before his admission into the Pennsylvania Hospital on June 20, 1810. The disease was uncommonly and uniformly violent. The derangements of his mind discovered themselves in long talking upon political subjects, preaching, praying, and in tearing his wearing apparel, sheets, blankets and even beds to pieces. The number of blankets destroyed by him was forty and the beds and furniture of the room did not escape him. By means of 47 bleedings by which he lost between 400 and 500 ounces of blood, and the use of the tranquiliser, cold applications to his head and the other remedies commonly employed for the cure of Madness he was restored to his reason and discharged on March 6th, 1811." Appended to this report is a long letter written by him on May 6, 1811, to the physician, Dr. Rush, who had charge of him, expressing his gratitude. Unfortunately in the following October the patient suffered a recurrence of his disorder during which he hanged himself.

There are reports of several cases in which a patient under treatment for a fracture or other injury developed delirium tremens.

During many of the years covered by this Record Book Mrs. Stephen Girard was a patient in the Hospital. The wealthy banker and founder of Girard College had married a woman very much younger than himself, for whom as years went on he developed a bitter hatred. In December, 1790, she was committed to the Hospital as an insane patient and remained in its cells until her death in 1815. About three months after admission, on March 28, 1791, Mrs. Girard gave birth to a child, which only lived until the following August. When the unfortunate woman died September 13, 1815, she was buried somewhere on the Hospital grounds at the request of Stephen Girard. The latter had paid all her expenses during her stay in the Hospital, and left the Hospital $30,000 in his will. There is no history of her case, or reference of any kind to her, in the Record Book.

Next to Rush in seniority on the Staff was Dr. Caspar Wistar (1761-1818) who had received his M. D. at Edinburgh in 1786 and succeeded William Shippen, Jr., as Professor of Anatomy in the University of Pennsylvania in 1808. Wistar was elected Physician to the Hospital in 1793 and remained on the Staff until 1810 when he resigned. Wistar succeeded Thomas Jefferson as president of the American Philosophical Society in 1815. He used to keep open house for the members of that Society and their friends on Sunday, later Saturday, evenings. After his death a number of his friends organized a Wistar Party, an association chosen among the members of the American Philosophical Society, which gave parties throughout the winter season on Saturday evenings to commemorate Dr. Wistar's hospitality, and these Wistar Parties are continued to the present day. In 1811 Dr. Wistar published the first " System of Anatomy " by an American. In 1792 Dr. Wistar was appointed adjunct professor to Dr. Shippen in the chair of anatomy, midwifery and surgery, and on Shippen's death, in 1808, professor of surgery in the University of Pennsylvania. At his death his valuable anatomical collection was presented to the University. Later Dr. Horner's collection was added to it, and the combined collections were known as the Wistar and Horner Museum, which later was incorporated with the Wistar

Institute of Biology, endowed by General Isaac Wistar in memory of his great uncle Dr. Caspar Wistar.

Philip Syng Physick (1768-1837) was elected to the Staff in 1794 and served the Hospital until 1816 when he resigned. Physick began his medical studies under Dr. Adam Kuhn and at the medical school of the College of Philadelphia. Three years later he went abroad and became a house pupil of John Hunter, who had him elected house surgeon in St. George's Hospital in 1790. He became a licentiate of the Royal College of Surgeons. John Hunter asked him to stay in London as his assistant but young Physick preferred going to Edinburgh where he received the degree of M. D. in 1792. He returned to Philadelphia. During the yellow fever epidemic of 1793 Physick served as resident physician in the hospital for fever cases at Bush Hill, where Girard College now stands. During this time he himself suffered two attacks of the disease. In this capacity young Physick's ability and devotion to duty attracted the favorable attention of Stephen Girard, the immensely wealthy merchant and banker, who later founded Girard College. Girard had a great prejudice against the medical profession, but made an exception of Physick, who he later employed as his physician and always regarded with admiration and respect. From the date of his election to the Staff of the Hospital in 1794 until his resignation in 1816, Dr. Physick was the most outstanding surgeon in Philadelphia and the reports of his cases are among the most interesting and important recorded in the book of reports. While considering Physick's cases we will glance at the nature of the surgical work in the Hospital. It must be borne in mind that these case reports only extend from 1803 to 1829, long before the introduction of anaesthesia or antisepsis and at a period when surgery in the three cavities of the skull, the thorax and the abdomen was almost never attempted. In 1805 Physick was appointed Professor of Surgery in the University of Pennsylvania. In 1819 he transferred to the chair of Anatomy, which he held until his resignation in 1831.

About forty years ago I had as a patient a gentleman in his late eighties who had been a patient of Dr. Physick. He had been an old friend and patient of my father's and aside from being lame he was in very good health. When he first came to see me professionally he

said " Of course, you have heard of the great Dr. Physick, I was one of his patients." He then told me that when he was a little boy he had complained of continual pain in his knee. One day his father told his nurse to take him around to see Dr. Physick. When they arrived at Dr. Physick's office the nurse told him about the pain in the little boy's knee. Physick bade the boy walk across the room several times, examined his leg closely and then told the nurse to take him home, put him to bed and keep him there till he could call and see him, stating that the patient's trouble was not in his knee, but in his hipjoint. Physick came to the house and put the leg in a long splint, known as " Physick's modification of Desault's splint." He then proceded to apply moxas over the thigh. The gentleman told me he lay in bed for months during which the moxa would be used at frequent intervals. Pulling down his trousers he showed me the scars left by them. The joint never suppurated and except for his lameness never troubled him. He thought Physick had first seen him in the eighteen-twenties when he, the patient, was five or six years old.

Tumors were generally denominated as " wens " in the records. One of Physick's most notable cases was that of James Hayes, who entered the Hospital on November 23, 1805, suffering from a tumor of his face which had been noticeable for twenty years, but increasing rapidly in size during the twelve months immediately preceding his admission. Dr. Physick removed it on Christmas Day, 1805, in the circular room of the Hospital, in the presence of Drs. Wistar and John Redman Coxe, and about " 80 students from different parts of the Union." The tumor measured twenty-three inches in its largest circumference and weighted seven pounds. In the course of the operation which the patient " bore with the greatest fortitude," the parotid duct was divided and the patient lost ten or twelve ounces of blood. On the second of March, 1806, he was discharged from the Hospital in good health. In December, 1806, he was readmitted to the Hospital with a recurrence of the tumor in the same place, which Dr. Physick removed. The recurrent growth weighed two pounds. He was discharged on April 20, apparently perfectly cured. There was no microscopic examination of the tumor on either occasion. In 1924, one hundred and eighteen years later, Dr. John R. Paul, then Director of the Ayer Clinical Laboratory of the Pennsylvania

Hospital, sectioned the growth which had remained in alcohol all those years and reported it to be a mixed tumor probably arising from a salivary gland.

The largest group of cases were fractures, of which there were twenty-seven. Fractures of the skull were treated on rational principles, the trephine and Hey's saw being used to remove depressed bone and relieve pressure on the brain. For fractures of the femur Physick used a modification of the long splint devised by Desault, with extension applied to the foot. Fractures of the leg were generally treated by placing the injured limb in a fracture box. A number of the cases of fracture suffered from delayed union, the patients frequently being sailors who had been injured at sea long before being brought to the Hospital. A typical case of this kind was that of a sailor who had fractured his left humerus while at sea, eighteen months before his admission to the Hospital in 1802. Dr. Physick introduced a seton at the seat of the fracture between the ends of the bone. Five months later he was discharged cured, the fracture having firmly united. Physick's son-in-law Dr. Jacob Randolph relates a curious sequel to this case. In 1830, twenty-eight years later, Dr. Randolph asked Dr. Physick to see a patient in consultation with him. The man was suffering from a "bilious fever." As Physick entered the sick man's room he immediately recognized him as the sailor whose ununited fracture he had treated twenty-eight years before. The patient then told him the arm was just as strong as his other arm and that he pursued his work with no inconvenience whatever. Some time later the man died and Dr. Randolph secured the injured arm. He states that the two ends of the bone were perfectly consolidated by a mass of osseous tissue, in the center of which was a hole through which the seton had passed.

In a case of ununited fracture of the tibia Dr. Physick used the seton with equal success. A man, thirty-five years of age, had sustained a fracture of the left femur and of both bones of the right leg, on November 20, 1807. "The thigh was treated successfully in the common mode. The leg, both bones of which were broken, was treated in the manner formerly recommended by the older surgeons. It was bent on the thigh, and splints applied without any permanent extension. It remained in this situation for four months, and at the

end of this time no union had taken place." The fracture was again reduced and the leg placed in a fracture box, but after six weeks no union had yet occurred. "A seton was then introduced according to the plan recommended by Dr. Physick. The Physician without considering the course of the arteries, or making any extension, passed the seton. The consequence of his inattention was that he wounded a large bloodvessel from which the haemorrhage was profuse. After some time he succeeded in stopping it, by introducing lint, compressing the part, elevating the limb and bathing it with cold water. The haemorrhage ceased, and he made another attempt to introduce the seton, which during the bleeding he had taken away: meeting with some obstacle which he could not surmount he relinquished it. The wound, however, was kept open for six weeks, during which the surface of the bones were irritated without the smallest good effect." At last on March 24, 1809, about 18 months after the leg had been broken, Dr. Physick inserted a seton between the fractured ends of the bones, because " considerable inflammation supervened, a blister was applied over the part affected." Eight weeks later " a perceptible union had taken place, the Seton discharged a healthy pus." On June 18, 1809, a few days less than three months after it was inserted, a part of the seton was removed, and ten days later the remainder of it. " He was discharged on the 29th of June with his leg perfectly recovered, after having lost the use of it for Two Years and Six Month."

Dr. Physick was especially famous for his skill in operations on the eye and for vesical calculus. The first cases recorded in a note book which he kept of his private cases from 1795 to 1810, was the successful extraction of the crystalline lens for cataract and the last operation which he performed was of the same character. The operation took place on August 13, 1837, and Dr. Randolph who was present testifies to the anxiety with which he witnessed it. Dr. Physick, he says, was " labouring under great mental and physical suffering," but he was quite collected and firm and his hand was steady. Physick died on December 15, 1837, four months later. The operation was a complete success. His famous lithotomy on Chief Justice Marshall was performed in 1831, when the Chief Justice was seventy-six years old and Dr. Physick sixty-three. Dr. Randolph who assisted on the occasion

was very much worried. Everything went off smoothly, however, and Marshall survived the operation four years, dying in 1835 of a diseased liver.

Dr. Physick wrote but little. His nephew Dr. John Syng Dorsey, published some of his uncle's work which serves to illustrate his originality and ability. In 1809 Physick devised and successfully performed an operation for artificial anus, which he described to his students and practiced during subsequent years. Unfortunately he did not publish any account of it and some years later the French surgeon Dupuytren published an account of a somewhat similar operation which he had invented. Dr. Benjamin Horner Coates got Dr. Physick's notes of the case he had operated on in 1809 and hastened to publish a vindication of Dr. Physick's claim to priority in the North American Medical and Surgical Journal for October, 1826, which it is satisfactory to know that Dupuytren subsequently acknowledged.

In the *Eclectic Repository* for October, 1812, Dr. Physick did publish a report of two cases in which he had washed out the stomach to remove laudanum, which had been administered in overdoses to two small children. This was the first recorded instance of the use of gastric lavage to remove poison from the stomach. Dr. Physick added that his nephew Dr. Dorsey had washed out the stomach in such a case in 1809. Later he also published a note to the editors of the *Eclectic Repository* stating that he had just learned that Dr. Alexander Monro, Jr., of Edinburgh, had suggested such a measure in his inaugural theses in 1797.

In Physick's day it was customary to use ligatures made of silk or flax. These, of course, did not dissolve in the wound and it was customary to leave them with the ends protruding out of the wound, thereby prolonging its closure. The projecting ends would be pulled on by the surgeon from day to day until they loosened and could be drawn out, thereby causing the patient much pain. In the *Eclectic Repository* for 1816, Dr. Physick published an article in which he advocated the use of ligatures made of animal tissue, which while securing the vessel for the necessary length of time to secure its obliteration would become decomposed and dissolved in the wound. Randolph says that from this period Dr. Physick employed animal

ligatures almost exclusively. Unfortunately this invaluable suggestion passed practically unheeded by his colleagues and it remained for Lister to introduce and popularize it. Randolph says, " I can attribute this neglect of them to nothing but the slight trouble attendant upon their preparation."

In the first volume of the *American Journal of the Medical Sciences,* 1827, Dr. Physick described an instrument for excision of the uvula and tonsils, which was the basis on which the tonsil guillotine was developed. It consisted of a ring surrounded by a circular knife blade, and was used for many years before supplanted by improved types.

In cases of fracture of the skull Dr. Physick and his colleagues were guided by sound surgical principles, relieving pressure, checking haemorrhage, and removing fragments of bone, or foreign bodies. In 1807 a sailor was injured by a fall on one of the packets which sailed between Philadelphia and New Castle, Delaware. He was brought to the Hospital a few hours after the accident. He was suffering from an extensive fracture of the left parietal bone. Dr. Physick made a large incision and found the posterior fragment driven forward and overlapping the anterior, not causing any compression of the brain. With a Hey's saw, a very popular instrument in those days, Dr. Physick removed the overlapping fragment, which was three inches long by one and a half broad. About ten weeks later the patient was discharged cured.

Dr. John Redman Coxe (1773-1864) has studied medicine in both London and Edinburgh but got his M. D. at the University of Pennsylvania in 1794, having preferred to finish his medical studies under the personal direction of Dr. Benjamin Rush of whom he was a devoted admirer. After graduation he had gone abroad again and studied in Paris, London and Edinburgh. Dr. Coxe was elected Physician to the Pennsylvania Hospital in 1802. He only served five years, resigning in 1807. Several of his cases reported in the Record Book are interesting. Under the heading " Phrenitis " there is reported the case of a boy, aged fourteen years, admitted on July 28, 1802, who, " for these 3 years past had been troubled at different times with a purulent discharge from his ears and pain in the forepart of the head. The running and headache never afflicted him at the same time, the latter always succeeding a suppression of the former.

Three days previous to his admission, the discharge suddenly stopped and a violent headache ensued, for which he was bled and had blisters applied to his wrists. When he came into the Hospital his skin was dry and warm, pulse quick and tense, face flushed, pupils dilated, he complained of nausea, and had been three days without having had a stool. At noon he had two Fits of the Epileptic kind. He was ordered by Dr. Coxe to be bled to 4 ounces, and to take Calomel gr. 1, every two hours, a Cathartic of Jalap and Gamboge was also exhibited. He slept the greater part of the night, but was very restless next morning and had three fits after which he became comatose and sweated profusely. A large Blister was applied to the head, the Calomel directed to be continued and as the purges prescribed yesterday had not operated, an injection was administered which produced a copious discharge of feces. At night he was much worse, his respiration was stertorous, and he was almost deprived of sensibility. He continued in this state until 9 o'clock the next morning when he died." *Dissection.* " The Brain was in a state of high inflammation, particularly between the two hemispheres. Adhesions were observed between the Dura and the Pia Mater. The Ventricles contained about 1℥ss of a thick transparent fluid."

There are three cases of tetanus reported on Dr. Coxe's service, one died, the other two recovered. The treatment they were given seems pretty heroic. Case No. 1, a boy of fourteen had received severe lacerated wounds of both legs by a fall from a horse. " Both wounds were dressed with sutures, and adhesive plaister to favour union by the first intention." Ten days later though the wounds appeared to be doing well, his lower jaw became stiff, and he complained of stiffness of the muscles of his back and abdomen. He was given a grain of opium every two hours and wine *ad libitum*, and, a favorite local application of Dr. Coxe's, boiling hot spirits of turpentine with salt, poured on the wounds. The poor boy was also given thirty drops of tincture of cantharides every hour, which had to be stopped after four doses because of violent pains in the stomach and strangury. However, powdered cantharides was scattered freely over the wounds, " in hopes of exciting a more vigorous action in the languid vessels." The next day the strangury had subsided but the tetanic symptoms were worse, locked jaws, opisthotonus and general rigidity. He was

ordered ten drops of tincture of cantharides every two hours, and opium and wine by mouth. He was given rectal injections of laudanum in wine, and mustard flour applied to his wounds. Later butter of antimony was substituted for the mustard. The pain continued to go from bad to worse. A large blister was applied to his head, and he was given vitriol and ipecac to induce vomiting. As the convulsions increased the attendants were ordered to " dash over him two bucketsful of cold water." He was rubbed with " strong mercurial ointment." He died twenty-two days after his admission to the Hospital having in that time taken " about 2400 drops of tincture of cantharides, about 2000 of tincture of opium, besides the quantity used in the glysters, and nearly three gallons of wine." The " Dissection " showed nothing particularly important except, as might be expected, some gastritis, but the kidneys and bladder were normal. The brain and spinal cord were not examined.

As I have said before Thomas Chalkley James (1766-1835) was the first member of the Staff of the Pennsylvania Hospital to be elected to a special service. He graduated from the medical school of the College of Philadelphia in 1787, and in the following year sailed as surgeon on a merchantman to China. The voyage over he went to England where he entered the Story Street Lying-in Hospital as a house pupil and then went to Edinburgh for further study. Returning to Philadelphia in 1793 he began practice but suffered a severe attack of yellow fever in the prevailing epidemic. In 1794 he went on the Western Expedition as surgeon of the Macpherson Blues. On his return he resumed practice devoting himself especially to obstetrics, being elected accoucheur to the Almshouse and also giving lectures to private classes. In 1810 he was elected to the first separate chair of obstetrics in any medical school in this country, the professorship of midwifery in the University of Pennsylvania, which he held until his resignation because of ill-health in 1834. Although there had been an occasional obstetric case admitted to the Hospital there was no lying-in ward in connection with it until 1803, when the Managers voted to open one. In 1807 the First City Troop of Philadelphia donated to the Hospital the pay which its members had recently received for their services during the Revolution for " the purpose of a Lying-in and Foundling Hospital." In 1810 the Managers elected Dr. James

Physician to the Lying-in Department, and he served the Hospital in that capacity until his resignation in 1832. In this Record Book there are reports of three fatal obstetric cases and one which survived on his service. All were healthy women, had normal labors and died of puerperal fever some days later. The history of the peregrinations of the Lying-in Ward will serve to illustrate the terrors of puerperal fever in the hospitals of that day. It was first opened in 1803 on the second floor of the East Wing. In 1817 it was moved to a large apartment known as the Contributors' Room. In 1824 the bookcases were removed from the Library and the Lying-in Ward installed in their stead. Six years later it closed and was not reopened until 1835, when it was located in a small isolated building known as the "Picture House." There it remained until 1851 when "the physicians came to the conclusion that the poison of puerperal fever had become endemic," and the ward was closed and the department finally abandoned in 1854. All of these removals were the consequence of outbreaks of puerperal fever, which were then only combatted by closing the wards, disinfecting them, and placing patients elsewhere. During this long period Dr. James was head of the service from 1810 to 1823, when he was succeeded by Dr. Hugh L. Hodge, who served until the department was closed in 1851. From 1839 to 1849 Dr. Charles D. Meigs was associated with Dr. Hodge. We all know how bitterly these gentlemen opposed Dr. Oliver Wendell Holmes' views on the contagiousness of puerperal fever.

Some of the most noteworthy case reports in the Record Book are those of cases operated upon by Dr. John Syng Dorsey (1783-1818), a nephew of Dr. Physick, who after studying medicine under his uncle and getting his M. D. in 1802 at the University of Pennsylvania, when he was but nineteen years old, became Dr. Physick's faithful assistant. To him we owe most of the published reports of Physick's work. The year after his graduation in medicine Dorsey went abroad and continued his studies in England and France. In 1804 he returned to Philadelphia and began to practice. In 1810 he was elected Physician to the Hospital. Three years before, in 1807, Dr. Dorsey had been elected Adjunct Professor of Surgery in the University of Pennsylvania. When Dr. Caspar Wistar died in 1818 Dr. Dorsey was elected to succeed him as Professor of Anatomy. On

November 2, of that year he delivered his introductory lecture, and the same evening became violently ill with what is said to have been typhus fever, and died in one week. His " Elements of Surgery " published in 1813 was held in much esteem.

The following will suffice to illustrate the variety of Dorsey's operations and his boldness and success as an operator. Under the heading " Case of a Wen," the case of " Julia Richards, a poor black-woman " is reported. The patient was forty-five years old, corpulent and healthy. A large tumor was present on her back in the dorsal region, which had been gradually increasing in size for eighteen years. At its attachment or neck, the narrowest circumference, it measured two feet, ten inches; vertically, through the thickest part, three feet, nine inches; horizontally three feet one and a half inches. After removal and being emptied of blood, the tumor weighed twenty-five pounds. A drawing of the woman with her tumor before operation was made by Mr. Sully, to accompany the report. The patient was given forty drops of laudanum before the operation, and twenty drops immediately afterwards. The operation occupied twenty minutes, the hemorrhage was trifling. The patient made a perfect recovery, the greater part of the wound healing by first intention.

In August, 1811, Dr. Dorsey ligated the external iliac artery in the pelvis, for an inguinal aneurism with complete success. The patient's only preparation was fifty drops of laudanum. Dr. Dorsey made his incision through the abdominal wall above Poupart's ligament. He cut through or pushed aside the tissues till he bared the artery, around which he placed a ligature by means of an aneurismal needle or blunt bodkin, and a pair of curved forceps, invented by Dr. Physick, who was present at the operation. In his notes on the case Dr. Dorsey states that ligation of the external iliac artery above Poupart's ligament was first performed by Abernethy, who operated on four patients with two recoveries and two deaths. The only other cases that he was aware of besides his own were successfully operated on in the Birmingham Hospital, one by Mr. Freer and the other by Mr. Tomlinson.

There are a number of other cases reported on which Dorsey operated; extirpation of an eye for a fungous growth, in a boy of twelve years, probably sarcomatous; several cases of strangulated

hernia and of lithotomy, enough to show that Dr. Dorsey was a bold and dexterous operator and make us regret his untimely death.

There are four reports in the Record Book of operations for stone in the bladder. One was that of a little girl aged eight years, who had suffered from symptoms of stone for five years. She was completely relieved by a perineal operation. The name of the operator is not given in the case history. Dr. Parrish operated successfully on one of the cases, and Dr. Dorsey was equally successful in another, both adult males. Dr. Dorsey operated unsuccessfully on a man aged thirty-two years. After the operation the patient had repeated haemorrhages from the bladder, finally dying three weeks and two days later. The stone was examined and found to have formed around a piece of lead about three quarters of an inch long. All of these operations were done through the perineum.

Dislocations

Very important adjuncts in the reduction of dislocations were staples on the floor or on the wall to which bands could be attached and used to produce extension or counter-extension. There is the report of the reduction of a dislocated shoulder. On April 5, 1815, a man, aged seventy-one years, was admitted to the Hospital with a dislocation of the humerus, the head of which could be felt under the pectoralis major. Previous to his admission repeated attempts at reduction had failed. " Dr. Hartshorne, the attending surgeon, bound a firm towel to the os humerus in the usual place and manner. A counter-extending band was placed against the acromion and scapula and kept so by the hand of an assistant, and another (broad) band was passed around the body and fastened to a staple in the floor. Very firm and pretty forcible extension downward and outward was made from the towel on the os humerus while the force was counteracted by the band against the acromion. After this extension and counterextension was continued for some time, they were suddenly relaxed, and at the same time the head of the bone pressed towards its socket and the arm to the body, which had the happy effect of reducing the luxation." The patient was discharged cured five days later.

Dr. Joseph Hartshorne (1779-1850) the surgeon whose method

of reducing a dislocation of the shoulder we have just quoted, was born in Alexandria, Virginia, and began the study of medicine under Dr. James Craik, of that city, the physician who attended Washington in his last illness. After studying with Dr. Craik for several years, Hartshorne served for five years as Resident Apprentice and Apothecary in the Pennsylvania Hospital also attending lectures at the University of Pennsylvania during his apprenticeship, and getting his degree in 1805. Dr. Hartshorne was elected Physician to the Pennsylvania Hospital in 1810 and resigned in 1821. He was much interested in diseases of the eye and the Record Book contains reports of several ophthalmic cases upon which he operated.

Dr. Joseph Parrish (1779-1840) was one of the Physicians to the Pennsylvania Hospital from 1816 until his resignation in 1829. He was a very skilful surgeon as indicated by the number and character of the cases operated upon by him and reported in this Record Book. Some of these were cases of strangulated hernia, inguinal or femoral. It should be remembered that operations for hernia were practically never performed except when the hernia was strangulated and such cases were frequently in a desperate state at the time that the operation was undertaken. Dr. Parrish was eminently successful in his results. He followed the usual routine before operating. This consisted in applying ice over the hernial sac; or placing the patient in a very hot bath; the free administration of opium and clysters of tobacco in solution and, after the hoped-for relaxation had been brought about, attempted reduction by manual taxis.

One of Dr. Parrish's cases was reported as a " Singular Growth of Tumors apparently from perforating the ear." In 1818 Rebecca Williams, a young black girl was admitted. Some time before she had had the lobes of her ears perforated for earrings. On admission she had two pedunculated tumors growing on the lobe of the right ear, and one on the left. They were all about one inch in width. Dr. Parrish excised them successfully. On examination they appeared to be composed of cartilage. A large drawing of the patient by Dr. Benjamin H. Coates shows the appearance of the tumors before operation.

Thomas Tickell Hewson (1773-1848) was elected Physician to the Pennsylvania Hospital in 1818 and resigned in 1835. He was

the son of William Hewson and " Polly " Stevenson, the daughter of Mrs. Stevenson, who was Benjamin Franklin's landlady for many years in London. William Hewson was William Hunter's very able assistant in his anatomical school and a very able and original anatomist, his researches on the lymphatic system winning him a well deserved reputation, and his early death from a wound received while dissecting cut off an eminent career. His son Thomas had received his early education in England, and lived at Passy with Benjamin Franklin, before the latter persuaded his mother to emigrate to Philadelphia with her young children. Young Hewson studied medicine in Philadelphia under Dr. John Foulke.[1] He then went abroad and served as a house surgeon at St. Bartholomew's Hospital, later going to Edinburgh for further study. He began practising in Philadelphia in 1800. In 1822 Hewson organized a private medical school in Philadelphia in which he taught anatomy and practice. He was an able surgeon and the Record Book contains reports of several cases of aneurism and of strangulated hernia, upon which he operated.

One of Dr. Hewson's cases of aneurism is reported at great length. The patient was a bricklayer, aged thirty years, who was admitted to the Hospital with " a large tumor in the ham spreading wide on each side of the knee. The integuments were very tense and in the most prominent part, which was in the ham, they were of a purple color. There was an obscure fluctuation in the tumor, but no pulsation. The limb below the tumor was swelled and oedematous, and the tibial artery could not be felt." A physician had made a slight puncture in the tumor and a little oozing of blood had followed. The day after his admission to the Hospital the patient was given a large dose of laudanum and Dr. Hewson made a free incision into the tumor, which he found full of coagulated blood. On loosening the tourniquet which had been applied over the femoral artery there was a free flow of arterial blood. Dr. Hewson then tied the femoral artery with a silk ligature, tying it in two places and dividing it between the ligatures." The wound was dressed with adhesive plaster, the ligatures left hanging out. It was the intention to remove as much as

[1] Hewson graduated in Arts at the University of Pennsylvania in 1789, but did not study medicine there.

possible of the coagulum from the aneurismal sac as could conveniently be done, and to unite the sides of the wound, but on taking away a portion of it, a flow, of arterial blood took place, which determined them to fill the cavity with lint." The temperature of the operated limb taken with a thermometer, was higher than that of the other leg. These thermometric examinations were repeated at intervals. There were repeated small haemorrhages from the wound. Finally on the ninth day after operation a profuse haemorrhage occurred "and cut him off immediately." At the post mortem examination "there was found a small aneurism of the popliteal artery which had burst, and the blood had been injected into the surrounding parts."

Aneurism

It is notable that the very frequent cases of aneurism which are reported are in every instance considered as the result of severe physical exertion, there being no case in which syphilis or alcoholism are regarded as causative factors. Dr. Physick operated on a case of popliteal aneurism in the left leg of a blacksmith, aged thirty-five years. The operation was a complete success, but six months later "unfortunately the Popliteal Artery of the right leg became aneurismatic." Dr. Physick operated on it, again with a completely successful result. The Resident Physician has added the following note: "P. S. There was a Patient in the Alms House, about two years ago with Popliteal Aneurism, who was also a blacksmith."

Nasal Polypii

Several cases of nasal polypi are reported. All of them were in the posterior region of the nose, projecting into the nasopharynx and their removal was accomplished by encircling them around the base with a wire passed through a double canula. The wire was left in place until the polypi sloughed off. In one of Dr. Wistar's cases he found it necessary to make an incision through the soft palate and dissect out the polypus through it.

Hare Lip and Cleft Palate

There is a picture of a case of very severe cleft palate and double hare lip which was operated on by Dr. Physick. A second picture shows a most gratifying result. The history of the case was not written up.

Two cases in the Record Book were of a kind not likely to be encountered by the modern surgeon. They were recorded as "Accidents from Bloodletting." Case 1, Mary Ellis, aged 25, was bled by a Farrier from the basilic vein. The operation was followed by profuse and repeated bleeding, which was finally stopped by pressure. About a month later she was admitted to the Hospital with a pulsating tumor in the site of the wound. Dr. Physick placed a tourniquet on the arm and made a large incision over the tumor, evacuating some blood and coagula. On loosening the tourniquet blood spouted from the artery at the bottom of the sac. Dr. Physick tied the vessel. A few weeks later the patient was discharged cured.

Case 2. A mariner aged 24 years, had been bled from the basilic vein by a sailor, about a week before admission to the Hospital. The wound had bled profusely and the haemorrhage was still only controlled by pressure. Dr. John Redman Coxe made a large incision over the pulsating tumor which had formed at the site of the wound. The artery was ligated with silk and the patient made a perfect recovery.

Several cases of amputation through the thigh for " white swelling " of the kneejoint are reported. One, in a little boy of six years was performed by Dr. Wistar, another by Dr. John Redman Coxe, on a young man of twenty-one. Both cases were discharged cured.

Yellow Fever

There is but one case of yellow fever reported in the Record Book. The victim was a patient " in the cells of the Pennsylvania Hospital, in which he has been confined seven years. . . . The patient has been employed during the hot months in removing and emptying the contents of the chamber pots from the cells upon the cellar floor of the Hospital, in doing which he was obliged to breathe an atmosphere highly charged with the unhealthy effluvia from the stools. This

effluvia acting upon his system debilitated by the heat of the season, and, thereby, rendered predisposed is sufficient to account for the production of this high grade of bilious or yellow fever, in a situation where a source of contagion could not be found, or imported fomes, by the most warm supporters of the importation and contagious nature of the bilious yellow fever. No malignant epidemic prevailed in the city, and only a few sporadic cases of yellow fever occurred during the summer. The man was never permitted to leave the walls of the Hospital or go into the city." In spite of the vomiting, diarrhoea, and jaundice which the patient suffered, the treatment consisted in a salivation, antemetics, cathartics, opium in repeated doses, vol alkali, brandy, frictions with the Decoct-Cantharid (lately introduced in practice by Dr. Hartshorne), blisters applied to the abdomen and extremities, and the application of mustard sinapisms. "The prostration of the system from the commencement of the attack prevented the use of the lancet. He was attended by Doct. Hartshorne, and once visited by Drs. Rush and Dorsey, all of whom concurred in the opinion of its being a case of yellow fever." The patient died on the seventh day of his illness. The autopsy report is of some interest: "Upon dissection after death, his blood was found of a dark colour, and in a dissolved state, his stomach contracted to ½ its natural size, and the internal Villous coat in a mortified state. The liver was natural, but the bowels were inflamed thro' their whole tract and partially adhered. The brain showed several marks of disease. The meninges were thickened, and adhered strongly to each other. The choroid plexus was in an indurated state, and highly coloured with blood.

A case of gunshot wound received in a fight at sea

In view of what is going on today on our Atlantic seaboard it is interesting to note the case which follows: "On the 24th day of 7 Mo., 1812, an engagement took place between the American privateer Matilda and British merchantman Ranger, during which Captain John Heard (the English captain) was wounded. The ball entered opposite the sixth Dorsal vertebra, fracturing the spinal process just at its base and piercing the spinal cavity immediately under it. The lower extremites instantly became paralysed, his stools passed

involuntarily and his Urine (after the bladder became very much distended) passed from over distension. He arrived at Philadelphia twenty days after the accident, and was brought to the Hospital the day after. His constitution had suffered very much from hectic, large sloughs had formed upon the sacrum, the wound discharged large quantities of serous matter, his lower extremities were quite insensible, and his bladder was very much distended. The ulcers were all dressed with poultices, and his bladder emptied of nearly half a gallon of urine. Nourishing food and drinks were given him in order to support his system, and when pain or uneasiness occurred Laudanum was administered." The Captain died five days after his admission. Autopsy revealed the ball within the spinal cavity, " and it considerably flattened."

THE WILLIAM OSLER MEDAL ESSAY

THE INOCULATION CONTROVERSY IN PURITAN NEW ENGLAND

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Probably nothing in the field of early American medicine was more revolutionary than the introduction of inoculation for the smallpox. And yet this important discovery was opposed and neglected for some years after it was known here. In fact the whole question was one of medical, religious, and moral importance and a storm center for some time. It was only through the efforts of a few men who realized what a remarkable advance this was, that it was received at all in that stronghold of religious and moral Puritanism, notably conservative and not prone to accept new ideas readily. Interestingly enough it was that great Puritan figure, Cotton Mather, who advocated the acceptance of this new practice. How contrary to our usual notions of that divine who has made a name for himself by his staunch and unyielding conservatism! And still more interesting, Mather was opposed by the only man in the colonies who was the possessor of the degree of Doctor of Medicine. The protagonists did not lack vociferous backing which resulted in the now famous "War of Pamphlets," and did not spare words, indeed their resorting to personalities would now invoke very often the use of present day libel actions.

The opponents of inoculation based their arguments upon what may be called essentially three points: religious, moral, and physical. Some were concerned with the physical aspect, while others were more interested in how the church and the Bible and God looked upon the methods that these new "cultists" were bringing in. Intimately connected with this last point is found the moral argument which plays a large part in this angle of the controversy, that is: "How do God and the moral principles which guide us treat this seeming thwarting of God's will?" And finally, is inoculation really helpful or does it introduce the disease into the body to no good

avail? The defenders supported themselves quite valiently with the inevitable Bible and statistics which were available after the initial inoculation attempts.

"When the eighteenth century opened, the population of the English colonies in North America was about three hundred thousand; when it closed, the United States numbered nearly four millions; and at the beginning of that era, of all the foes our ancestors faced,—hardship, famine, pestilence, Indian and foreign wars,—the most dreaded was small-pox."[1] In these days of public hygiene, we have no conception of the part that smallpox played in those earlier days. Sixty per cent of mankind were attacked and ten per cent died. Of the theories advanced as to the origin of the disease, that which assumes that it originated in the East and remained endemic there for centuries, seems the best of all. After sweeping through Europe it was transmitted to America by the colonists and caused them no end of trouble. There were eight epidemic outbreaks between the years 1633 and 1702, prior to the introduction of inoculation. Benjamin Colman refers to the epidemic of 1677 as "that terrible epidemic which carried so many away." In fact, the plague of smallpox played such a part in the early days that it is significant to note that the first American medical publication of which we have record appeared in Boston: "A Brief Rule to guide the Common People of New England how to order themselves and theirs in the Smallpocks, or Measels" by Thomas Thacher.[2] It was also the epidemic of 1677 which stimulated Thacher to write this tract, which had such popularity that it went through a number of reprints and was even called forth again in 1721 during the inoculation affair. In reading Samuel Sewall's Diary one feels the constant terror among the people of Massachusetts Bay and remarks their futile efforts towards conquering the disease. About the extent of their preventive measures was the stopping of ships from entering, for it was noted that the arrival of slave ships from Africa directly preceded outbreaks of smallpox. In 1700 the legislature of the colony of Massachusetts tried to prevent importation of the disease by fining all

[1] Mumford: A Narrative of Medicine in America.

[2] Thomas Thacher: A Brief Rule to guide the Common People of New England how to order themselves and theirs in the Smallpocks, or Measels. Boston, 1677.

masters of ships who did not submit to inspection when entering a port. This was disallowed by the Privy Council that same year but temporary legislation was passed and quarantine laws were in effect from 1702 on. That year the epidemic reached such proportions that the General Court assembled in Cambridge rather than in Boston. Three hundred died from its ravages. It was in an atmosphere such as this that a cure for the smallpox was introduced.

Inoculation against the smallpox was brought in during the epidemic beginning in 1721. It was hotly opposed by a number of the colony to such a degree that it may be truly said to have been an "inoculation controversy" or war. The controversy raged even up to 1798 when Jenner's new method of "vaccination" superseded the old ingrafting way. The eminent divine, Cotton Mather, and a rather famous physician, Zabdiel Boylston(e), were the proponents of this new way. They were ably assisted by a few of the more outstanding and influential men both clergy and others. The opposition was led by William Douglass backed by no few of the more outraged of the colony.

Little needs be said about Mather, for his fame is far-reaching, although this distinction is for other reasons than the liberalism he exhibits during the period of the controversy. He was a distinguished politician, preacher, and arbiter on a number of subjects. But in 1721 he was becoming old; his greatest work, the "Magnalia," had long since been written and the witches had long since been hanged. Boylston was probably one of the most distinguished and interesting of the group of physicians of that day. He was not only famous as a medical man but he had acquired a reputation as a botanist and zoologist. Universally respected and loved because of his character and kindness, his word carried no little weight. He didn't have a medical degree, but as was common in that day, he had studied under a local physician and had acquired the knowledge of his art in that way. "His is a great name in Boston, with some reason, let us believe, for he represents that type of steady conservatism joined to scholarship and readiness to accept the new in demonstration which we admire in all ages." [3]

[3] Mumford: A Narrative of Medicine in America.

Of the three, William Douglass was probably the most interesting. He had received his education in Edinburgh, Paris, and Leyden, and was a man, well-learned and of many accomplishments, though of a peculiar disposition which kept him continually in controversy. It was said of him that he was always positive and occasionally right. He was obstinate, a hard and unrelenting fighter and an excellent hater. One hears either good or very bad things about him. His fame dates from the time of the controversy of 1721. It is with these men that we shall be mainly concerned, for it was they who were at the head of the forces. Around them were grouped lesser lights who contributed their own little bit in the way of tracts, pamphlets, letters, and advice. They will be mentioned in their place.

William Douglass, when he came to Boston, had brought letters of introduction to the more important men of that city, among them Cotton Mather. Mather showed little interest in the young man who, nevertheless, tried to cultivate him. Douglass supplied him with the more recent literature of the day, especially the papers of the Royal Society of London, the *Philosophical Transactions*. Among these *Transactions* Mather read in the April-June 1714, copy, an account of the inoculation for the smallpox as practiced in Constantinople, as reported by a Doctor Emanuel Timonius. Mather had a servant, Onesimus, who had undergone inoculation in Africa and who had withstood a number of epidemics both in Africa and America. He found that Onesimus' description and Timonius' account agreed and upon learning that the method was exceedingly successful, wrote to Doctor John Woodward of England asking, "How does it come to pass, that no more is done to bring this operation, into experiment and into Fashion . . . ?"

Then in 1716 there appeared in the *Philosophical Transactions*[4] an account by a Doctor Jacobus Pylarinus of the condition in Constantinople as regards ingrafting or inoculating. Douglass showed this to Mather strengthening his desire to introduce this practice into Boston. Mather had therefore known, five years before the 1721 epidemic, of the efficacies of smallpox inoculation. His introduction and embracing of this new method must not have been a hasty, unfounded decision, but a well-thought out, deliberate plan.

[4] *Philosophical Transactions*, vol. XXIX .

This conclusion in the light of subsequent developments would seem important. It is conceivable, in the reading of later pamphlets, that Mather had talked with a number of African negroes (as had Benjamin Colman) and thereby learned more of the frequency and technique of inoculation. In May, 1721, smallpox was brought to Boston in ships from Saltertudas (Tortugas) where the smallpox was raging. On May 12th, eight days after the arrival of the ship, *Seahorse*, there was one sickness in Boston. By May 27th, there were 80 cases and the epidemic increased in severity therafter and continued throughout the fall and following winter. In the *New England Courant* June 15th-22nd, 1721 one hundred deaths were reported and no more than ten or twelve families were spared. It was at this time that Mather appealed to the doctors of Boston to convene and "deliberate upon the operation that whosoever first begin the practice (if you approve it should be begun at all) may have the countenance of his worthy Brethren to fortify him in it." The doctors disregarded Mather entirely and only one, Doctor Boylston, showed any interest. It was this same Doctor Boylston and Mather who were to stand together against the subsequent cavils, slanders, and threats made by the "anti-inoculators." It is to be seen that Mather's method was thoroughly ethical and that he made no attempt to encroach upon any of the medical men's privileges. Douglass probably minimized Mather's discovery because of his own anger that such a chance for a brilliant step should be championed by a rank outsider. He resented the interference of the ministers in his profession, and as the only Doctor of Medicine in Boston, he undoubtedly felt called upon to defend the medical practice and its professional conservatism. Douglass, in his *Inoculation of the Small-pox as practiced in Boston*,[5] declares that everything which is printed in the *Philosophical Transactions* can't and mustn't be used practically. He opposed the promiscuous inoculating of people as harmful in that it spreads the disease. His points are seemingly well taken and must have had quite a bit of weight in that day.

Boylston, backed by Mather and others, took the first step on the

[5] William Douglass: Inoculation of the Small-pox as practiced in Boston. Considered in a Letter to A—— S—— MD & FRS. Boston, 1722. Massachusetts Historical Society #30.

26th of June, 1721, by inoculating his six-year-old son and two slaves. This was about six weeks after the pioneer inoculation in England. A bit over a week later he was assured of success as the three patients survived. Instead of being hailed as a forward step and accepted enthusiastically, this was greeted with far greater opposition than had been evinced before. As Doctor Kilpatrick expressed it,[6] "The Novelty of seeking Security from a Distemper, by rushing into the Embraces of it, could naturally have very little tendency to procure it a good Reception on its first Appearance." Hutchinson [7] writes, "Inoculation was introduced upon this occasion contrary to the minds of the inhabitants in general, and not without hazard to the lives of those who promoted it, from the rage of the people." Against Doctor Boylston "the vulgar were enraged to that degree that his family was hardly safe in his home and he often met with affronts and insults in the street. . . . Many sober and pious people were struck with horror and were of the opinion that if any of his patients should die, he ought to be treated as a murderer."

The outcry against Boylston was so great that he issued a public statement to the following effect, "I have patiently born with abundance of Clamor and Rotary for beginning a new Practice here, (for the good of the Public) which comes well recommended from gentlemen of Figure and Learning and which well agrees to Reason, where try'd and duly considered, viz., artificially giving the Small-Pocks to One of my children and two of my Slaves in order to prevent the hazard of Life, which is often endanger'd and lost by that Distemper in the Common Way of Infection . . ." Lynching was threatened by the mob, and he couldn't continue his practice but at night with stealth. His house was attacked several times and at one time a bomb was thrown at it but to no avail. Their violence subsided only with the slackening of the disease.

Mather himself was threatened and writes in his *Diary*, July 16th, 1721, ". . . And not only the Physician who began the Experiment

[6] J. Kilpatrick: An essay on inoculation occasioned by the small-pox being brought into S. C. in 1783, with an appendix containing a faithful account of its event there: and a summary relation of the principal cases. London, 1743.

[7] Hutchinson: History of Province of Massachusetts Bay, 1767, II, 273.

but I also am an Object of their (People) Fury: their furious Obliquies and Invectives." Later in that year, November 14th, the opposition to Mather's part in the affair was carried to the extent of actual violence, for on that day a bomb was thrown into his window. Fortunately enough, the fuse fell off, and interestingly enough disclosed a note addressed to Mather: "Cotton Mather, I was one of your Meeting; But the Cursed Lye you told of—You know who; made me leave You, You Dog, and Damn You, I will Enoculate You with this, with a Pox to you." It is evident that this war against inoculation not only involved medical conservatism and religious bigotry, but politics, personal quarrels and grudges.

The opponents of inoculation carried their entreaties to the Council Chamber and on July 21st, 1721 when the Selectmen convened, after listening to a vehement outburst on the part of a Doctor Lawrence Dal 'Honde who offered his own version of previous inoculations, they forbade Boylston to inoculate from that time forward. He disregarded them. It seems that Dal 'Honde pictured to the people, accounts of the horrible results of inoculation in Italy, Spain, and Flanders [8] which must be considered as either mistaken or fictitious. In any case, they had a profound effect when they were published, and again stirred up a violent hatred for Boylston and his practices. In all of the trials encountered by the inoculators, Mather stood by Boylston, and several other ministers joined forces with Mather, for he still exerted no mean influence. Boylston, however, wasn't wholly deserted by his medical brethren, for during the course of this epidemic of 1721, he was joined by Doctor Roby of Roxbury and Doctor Thompson of Cambridge, who inoculated between them about thirty-nine persons.

Newspapers played a great part in the controversy. They were the means of disseminating the arguments offered by both sides. Outstanding in attack of inoculation was the *New England Courant*, published by James Franklin in Boston. It is interesting to note that Benjamin, James' brother, was an apprentice on the paper at

[8] Zabdiel Boylston: An Historical account of the Small-Pox inoculated in New England, Upon all Sorts of Persons, Blacks, and of all Ages and Constitutions . . . Humbly dedicated to Her Royal Highness the Princess of Wales, by Zabdiel Boylston, Physician. London, 1726, Boston, 1730.

the time of the friction between the sides. The *Boston Gazette* was more on the side of the inoculators although both papers accepted items which dealt with either aspect of the controversy. A fiery letter from Douglass' pen, published in the *Gazette* on July 24th, under the name of W. Philanthropos, was answered by the "inoculators," refuting the accusation that inoculation was contrary to God's law. It was in the religious scruples of these earnest Puritans that the inoculators found their most stubborn obstacle. It was indeed fortunate that they could command such theologians and philosophers as the Mathers, Colman, Cooper, and others, for the arguments brought forward by the conservatives well needed brilliant minds. The medical men themselves gave way to the divines who waged this "pamphlet war" quite out of keeping with their calling of teaching the words and deeds of Christ. As can be seen then, the arguments of the medical men were of minor importance. However, two objections of a medical sort seemed to have emerged in the debate: was there danger to the community in the spread of the disease, and then was the danger to the inoculated such that he was in acute danger?

In August of 1721, Boylston issued a pamphlet, his first,[9] in which he sets forth the technique of inoculating as practiced by Pylarinus, and under "Remarks" defended his undertaking the whole practice. Evidently there was some difficulty in making the people believe that the account of what was in the *Philosophical Transactions* was reported truly, for under "Remarks" again were these words: "The Author of these Abridgements address'd them unto those, who had the Originals in their Hands: and therefore it cannot be thought, that it was not as Faithful a Report as he could make of the matter: But it having been insinuated that there might be a more full and perfect Relation. The Author desires it, and I desire it myself, That the accounts given in the *Philosophical Transactions* be permitted by the Owner to come abroad and be published

[9] Zabdiel Boylston: Some account of what is said of Inoculating or Transplanting the Small-Pox. By the Learned Doctor Emanuel Timonius, and Jacobus Pylarinus. With some remarks thereon. To Which are added, a Few Quaeries in Answer to the Scruples of many about the Lawfulness of this Method. Published by Zabdiel Boylston. Boston, 1721.

Word for Word, that the impartial Men may see it with their own eyes, the true state of the Case." The owner of the *Transactions* was William Douglass himself, and so it appears certain that this invitation to disclose the source of the whole affair was not accepted. An enlightening part of Boylston's tract is entitled, "A Few Quaeries Humbly Offered." In it he attempts to solve the religious questions offered by the opponents. In this we detect a decided Matherian tinge—I doubt whether Boylston was much of a philosopher or moralist. Two of the " Quaeries " deserve notice:

> " It is Objected, That you Presume upon Providence in this Essay for the Prevention of the Small-Pox: for you don't know whether you shall have the Small-Pox or no. . . ."
>
> ans. I answer, But what if it be as likely that I shall have it, as it is that my house will take Fire, when my Neighbor's a mile and a half off, is in *Flames, Pray, sit still, my Neighbor. Your House is not yet on Fire: The Almighty can preserve it.* " There is a silly cavil; we pray that the Small-Pox may not spread; and we do ourselves by Transplantation, spread it."
>
> ans. But I Enquire whether People know what they pray for? Our Prayers are, that a Dangerous and Destructive Small-Pox may not spread. We do not pray, that the use of an Effectual means to save our Lives from The Dangers of Destruction by the Small-Pox may not be Revealed, Practiced, and Prospered.

To a layman, it appears to be unassailable logic.

Reverend Benjamin Colman in 1721 published a book *Some Observations*[10] *of the new method of receiving the Small-Pox by ingrafting or inoculation* which defends valiantly the whole business of inoculation. Colman begins by singing the praises of Doctor Boylston and his method, excusing his faults while rejoicing with him in his triumphs. Colman protests that his sole motive for writing this " piece " is for the " Saving of Lives that they may redound unto the name of God." " God knows that I am not prejudiced. I would as soon be against Inoculation but I have seen it work." We sometimes doubt the truth of that last statement, for Colman was a staunch cohort of Mather and a rabid " inoculator."

[10] Benjamin Colman: Some observation of the new method of receiving the Small-Pox, by ingrafting or inoculation. Boston, 1721.

Reverend William Cooper, later in that year, published a pamphlet [11] supporting his colleague, Rev. Colman. The consciences of the objectors seemed troubled by such questions as these:

". . . it is not lawful for me to make myself sick when I am well?"

ans. To make oneself sick when one is well is all right for it serves a good end.

"What then, will you not wait God's time for it?"

ans. That Time, is when imminent danger and immediate danger is ahead.

"You're taking God's work out of His Hands!"

ans. If God does not cooperate by His actual Providence, can the effect be produced?

"Small-Pox is a Judgement of God, sent to punish and humble us for our Sins; and what shall we evade it, and think to turn it away from us?"

ans. Yes, it is God's Judgement but at the same time He sends His Judgement He shows us a Way to escape the Extremity and Destruction at least, if not the touch of it.

"But suppose I should die in the Way of Inoculation, would it not make my dying hour very dark for me, to think that I us'd means to bring it upon myself?"

ans. If a Person should die under Inoculation, he dies in the Use of the most likely means he knew of, to save his life in a time of common peril; he dies in the Way of Duty and so in God's Way.

Cooper allays the rather preposterous fears very well. The logic is excellent and one can't help but think that it must have done a good job in quieting some of the conscientious objectors.

Cooper received his answer in a pamphlet with another long title: [12] *An Answer to a Late Pamphlet, Intitled, A Letter to a Friend in the Country* . . . Written probably by John Williams, the "Mundungus" of some fame at that time, famous for his attacks on

[11] William Cooper: A Letter to a friend in the country attempting a solution of the scruples and objections of a conscientious or religious nature, commonly made against the new way of receiving the Small-Pox. Boston, 1721.

[12] An Answer to a Late Pamphlet, Intitled, A Letter to a Friend in the Country, attempting a Solution of the Scruples and Objections of a Conscientious and Religious Nature, commonly made against the new way of receiving the Small-Pox. By a minister of Boston. Together with a Short History of the late Divisions among us in Affairs of State, and some account of the first cause of them. Boston, 1722.

inoculation and his queer garbling of the English language. Williams was much in favor of the death penalty for those who practiced inoculation—". . . whoever may do anything that may spread a mortal and contagious disease, they shall suffer Death." This strikes well the key-note of the anti-inoculator's position. Those who had a religious conviction that it was wrong, were convinced that it was of the devil, who had devised it to rid the world of the Christians. The devil to those Puritans was not an abstract personification of evil, but one who was present at all times and against whom they must guard themselves. Williams enlivens the pamphlet with some rather amusing anecdotes. He tells of the gentleman who, calling at a neighbor's, was mistaken for Doctor Boylston and had his saddle tarred, thereby spoiling a good pair of breeches. Williams argues that the bill should go to the ministers for their incurring the enmity of the perpetrators of the deed.

At the beginning of the following year (1722), Douglass brought out his first contribution to the " War " : his *Inoculation of the Small-Pox as Practised in Boston, Consider'd in a Letter to A—— S—— M. D. & F. R. S.*[18] It is a sharp, piercing piece which directly makes fun of Mather and taunts him for playing such a leading role in the persecution of the witches so many years before—a rather unfair attitude. Douglass refers to him as a " Man of Whim and Credulity " and laid him out with what must have been some telling blows, answering his arguments and accusing the inoculators on a number of points. The tract indicates that the " Inoculators " should stick to one reason for arguing for the continuance of their practice, and that is the success of it. Douglass believes that all other arguments are of no value. He outlines the anti-inoculators' charges and backs them with reasons. His statistics differ substantially from Mather's and Boylston's and even from his later " Summary " written in 1751. It is, however, the sanest, best-written, and most telling book of the anti-inoculators. Douglass has something to say and he says it in a simple straightforward fashion, omitting the frills and sticking strictly to the business at hand.

[18] William Douglass: Inoculation of the Small-Pox as practiced in Boston. Consider'd in a Letter to A—— S—— MD & FRS. Boston, 1722. Massachusetts Historical Society #30.

This tract, and others too, has its answer in a pamphlet written by some unknown author (*A Vindication of the Ministers of Boston, from the Abuses and Scandals, lately cast upon them, in Diverse Printed Papers.*[16] *By Some of Their People.* Mather is defended and the aspersions cast upon him by Douglass and his crowd are denied. The nobility and the dignity of the ministers was maintained and those who attempted to besmear them were held in utmost contempt. The author points out that the ministers didn't step out of bounds by indicating the errors of the practice. They had referred the matter to the physicians but had been rebuffed at every turn.

It is noted in some of the pamphlets and the *Courant* articles that the Mathers and others were taken to task for their parts in the witchcraft "infatuation" of some thirty years before. The anti-inoculators a bit unfairly coupled the inoculation affair with that witchcraft outburst of 1692, for there is little doubt that during the hysteria of the moment, they themselves joined in and just as loudly called—"Hang them."

On February 26th, 1722, the Selectmen inserted an official statement in the *Courant*, that nobody in Boston was known to have the smallpox. Boylston continued to inoculate until the middle of May when he appeared before the Selectmen and gave them his word that he wouldn't inoculate in Boston until he received the approval of the authorities. In this quiet way the inoculation experiment was finished. Boylston and Mather had done their work well. Only sporadic outbursts occurred after 1722 when epidemics broke out in 1730 and 1752. The groundwork had been laid in 1721 and so the defenders had a comparatively easy time thereafter, especially when Douglass was won over.

During the course of the 1721-1722 epidemic, there were 7,989 decumbent out of which 844 died (1 out of 9). In and about Boston 286 were inoculated by Bolyston and his helpers, whereof the inoculators acknowledged 6 to have died, which is about 1 in 48. This evidence certainly points to the efficacy of the inoculation but it still took some time for the people to get used to the idea.

[16] A Vindication of the Ministers of Boston, from the Abuses and Scandals, lately cast upon them, in Diverse Printed Papers. By Some of their People. Boston, 1722.

As early as August 1721, some Boston doctors had organized the Society of Physicians Anti-Inoculators, which met at Richard Hall's Coffee House. Douglass was the leader, naturally, and had as companions an apothecary, John Checkley, a tobacconist, John Williams, James Franklin, and others. Franklin's *New England Courant* was the medium for their ideas, beginning as it did right in the middle of the controversy. Their purpose was minimizing of the case for inoculation as their title indicates and their methods were any which would do the work.

Smallpox in England had been epidemic straight through the Boston affair. Inoculation had been tried there in 1718, three years before the Boston experiment, but had been dropped. In August 1721, seven condemned prisoners at Newgate, in consideration of a pardon and at the behest of Princess Caroline, volunteered to be inoculated. All seven of the criminals had successful inoculations. Despite the fact that London had a start on the colonies, they had inoculated only 145 persons up to February 1723, while Boylston himself had inoculated 247 from June 1721 to May 1722.

In 1722, two Royal Princesses submitted to the operation and passed through it successfully. This was instrumental in helping change the tide and popularizing the practice. Douglass in 1730 writes: *A Dissertation concerning Inoculating of the Small-Pox.*[18] "The Royal Family by their Example, have obviated the Suspicion, which made the practitioners here decline it formerly, I mean its being Criminal." But in 1722 he wrote: "By the Accounts from England we find the Inoculation to ensnare our Mother Country, have sent home, and industriously had published, sundry false Communications concerning the Small-Pox, and the Inoculation thereof." It would seem that Douglass earlier was a bit stirred up about the reception that England was giving to inoculation, but upon seeing the futility of his efforts, took an opposite stand.

Inoculation had begun in Boston with no influence being exerted by the old country and progressed more rapidly there than in Europe, but when favorable reports, as above, came from London, the inoculators made good use of it. One particular item exited the anti-

[18] William Douglass: A Dissertation concerning Inoculating of the Small-Pox. Boston, 1730.

inoculators quite a bit. It was a report from the *London Mercury* reprinted in the *New England Courant*:[16] "Great Numbers of Persons in the City, and in the suburbs, are under Inoculation of the Small-pox. Among the rest, the eldest son of a noble Duke in Hanover Square, had the Small-Pox Inoculated on him." The fact that a noble duke espoused the cause of the inoculators was a heavy blow to the opposition, and so it isn't strange to see in the next issue of the *Courant* a letter addressed to the "Author of the New England Courant" accusing some "busy inoculator" of garbling the news. This unknown quoted what he believed was the true story of the incident. It so happened that this last writer was probably in the wrong, for James Franklin in a later issue explained that he had made a mistake in publishing the second letter. Franklin was quite upset that he should be played upon as a "credulous" fool and vowed that he should never again publish news which had not been checked.

During the controversy, Douglass' letters to a London physician were received with respect by his colleagues there and quoted frequently to prove that all was not as it should be in the colonies. The inoculators, too, had their outlet to the people of England in the person of a Doctor Maitland, a surgeon whose patron was Lady Montagu, who in turn was a defender of inoculation in those early days in England.

Not all of the clergy were sympathetic even as late as 1730. The Reverend Edmund Massey delivered a sermon in England (*A sermon against the dangerous and sinful practice of inoculation*) in which he maintained that the devil was the first inoculator when he "smote Job with sore boils from the sole of his feet unto his crown." He concluded that "the cutaneous disease of Job was produced by inoculation from the hands of the devil, and the whole art was of infernal invention." This is interesting as Job's affliction has, at various times been said to be due to syphilis or typhoid fever. The inoculators did not lack for good men in England. Doctor Maitland replied to Massey and to Wagstaffe, who was outstanding as a friend of Douglass, in a tract which quoted a letter by Cotton Mather, in

[16] *New England Courant*, issue of January 1. 1722, #22.

full, telling of the success of the practice in Boston and just how matters stood there. Douglass also carried on a correspondence with a Doctor Stuart of London and relayed on to him reports of the cause in Boston, not sparing in his scorn for Mather and Boylston. These series of letters stimulated an interest in England for the experiment in Boston and from thereon it was watched with a degree of interest not shown before.

Mather communicated several items of interest to the Royal Society to be printed in their *Philosophical Transactions*. A number of them actually were published,[17] one of which showed the results of inoculation as seen through the eyes of "one of the Faithful." Colman's and Cooper's articles also were printed in England, having been reprinted, from their tracts here.

Boylston, after the stir of the fight was over, made a trip to England in December 1724, where he spent over a year. After his arrival in that city he was made a member of the Royal Society, the first American to receive that honor (Mather not having gone through the formalities demanded). While in London, he published in 1726 at the request of the Royal Society, an account of his method of inoculation.[18] It was dedicated to the Princess of Wales who had been the patroness of inoculation from the start when she had made it possible for experimentation to be done on criminals and paupers. Boylston in this work gave the accepted figures of those inoculated and the mortality, and the incidence and morbidity of smallpox the "natural way" (page 180). The inoculation controversy was still raging in England, and so Boylston helped much to bring about a clearer understanding by this tract. So much so that the King presented him with one thousand guineas and gave him the honor of a royal reception.

[17] An Account of the Method and Success of Inoculating the Small-Pox, in Boston, in New England. In a Letter from a Gentleman there, to his Friends in London, 1722. The Way of proceeding in the Small-Pox inoculated in New England. A Letter to the Learned Caleb Cotesworth, M. D. . . . Containing a Comparison Between the Mortality of the Natural Small-Pox, and that given by Inoculation. Boston, 1723.

[18] An Historical Account of the Small-Pox Inoculated in New England, Upon all Sorts of Persons, Whites, Blacks, and of all Ages and Constitutions. . . . Humbly dedicated to Her Royal Highness the Princess of Wales, by Zabdiel Boylston, Physician.

By 1730, most of the Anti-Inoculators had retracted and were practicing inoculation, although Douglass could never forgive either Mather or Boylston. In that year he published *A Dissertation concerning Inoculation of the Small-pox* [19] in which he brands Boylston as a "quack doctor" and denounces his accounts of inoculation as advertising. Douglass maintains that Boylston went to England with the view in mind of making a fortune but that he was not asked to perform one inoculation while he was there. One can imagine Douglass chuckling quietly to himself contemplating this.

In his *Summary* printed in 1748 and 1751,[20] Douglass relates his attitude then (in 1721) and explains why he reacted as he did towards the introduction of inoculation. He attempts to show that he was the prophet of the true method.

> The Novel Practice of procuring the Small-Pox by Inoculation is a very considerable and most beneficial Improvement in that Article of Medical Practice. A direct about-face for Douglass.
>
> It is true the first Promoters of it, were too extravagant, and some Medical writers, Instance sundry Disorders arising in the Animal Œconomy from some foreign Liquids being directly admitted into the Current of the Blood: These Considerations made me in 1721, not enter into the Practice, until further Tryals did evince the Success of it: but now after upwards of thirty years of Practice in it in Great Britain, and the Dominions thereto belonging, we found that the Small-Pox received by cuticular incision has a better chance for Life and easy Decumbiture: That is, the Small-Pox so received is less mortal and generally more favorable than when received in the accidental or natural way, by Inspiration, Degluition, Pores of the Skin, and the like: we must still acknowledge, that it falls short of the Recommendations given by its first Promoters, being no Absolute Security against Death and the other Calamities of the Small-Pox . . .

This to my mind, is the most interesting piece which has come down to us from that time. We detect in those few lines Douglass' still intense dislike for Mather and Boylston, and we can feel his almost reluctant acceptance of the new usage. We can see his unwillingness to admit himself in the wrong—a human characteristic after all. It

[19] A Dissertation concerning Inoculation of the Small-Pox, Boston, 1730.

[20] William Douglass: A Summary, Historical and Political, of the first Planting, progressive Improvements, and present State of the British Settlements in North America. Boston, vol. 1, 1748; vol. 2, 1751.

must have been a terrible task for Douglass to publish a statement like that even though it was thirty years later.

In that *Summary*, Douglass relates his story of the history of the controversy. We recount it here so that a comparison may be made between the actual happenings and the story of one of the "combatants."

1713—Timonius from Constantinople sent to the Royal Society in London; incredible recommendations of this practice, that for the preceeding eight years some thousands had been Inoculated and none died. Pylarinus in 1714 sent to the Royal Society a modest account of the same which Douglass had.

1721—(Can we accept this date as the correct one? Other sources indicate that Mather knew in 1716) I lent these Communications to Doctor Cotton Mather, a clergyman of Boston, being very credulous, that is of great Faith, when the Small-Pox appeared in Boston, that he might have the imaginary Honor of a new-fangled Notion, surreptiously without my knowledge, set a rash undaunted Operator to work, and by three Practitioners in Town and City, about 286 were inoculated, whereof about one in forty-eight died in Boston.

> This undaunted Operator, imagined that by going to London with a Quack-Bill of his Inoculation Performances in New England, he might acquire a fortune in London,—but so it happened, that void to common Discretion to couch his Ignorance and silly mean assurance, he returned to Boston without being called upon to perform any Operation. (It is to be seen that Douglass repeats what he wrote in his *Dissertation*, 1730.)

The first Promoters were incredibly marvellous in their Accounts as would have discouraged any sober Man to have attempted it, if the subsequent more moderate Accounts of its Success had not given a reasonable Encouragement. Timonius wrote, that of the Thousands Inoculated in the Space of eight years, none died. LeDuc writes that in the space of about forty years; out of many thousands Inoculated by one Greek Woman, in and about Constantinople, not so much as one Person had miscarried . . . Mr. Maitland in his printed Account (Douglass is referring to Maitland's "Account of Inoculating the Small-Pox Vindicated, from Doctor Wagstaffe's Misrepresentation of that Practice, with some Remarks on Mr. Massey's Sermon." London, 1722) says: "Dying is a case which never happened in Ingrafting; that the giving of the Small-Pox by Inoculation never yet failed nor ever can. . . . Doctor Brady of Portsmouth writes "not one ever died of Inoculation rightly performed, it is always avoidable . . ." Doctor Harris says, that Inoculation is a certain Remedy against the confluent kind. Mr. Colman, a clergyman and principal Promoter of the Practice in Boston of New England, publish'd that "none die, nor Blains or Boils follow the Practice . . ! Mr. B . . . ton,

the first Operator, publish'd, 'There is no Truth in the Reports of People dying under Inoculation,' His accounts are so absurd they invalidate themselves, and require no other animadversion . . ."
Douglass shows his undying animosity again. "Other Inoculators have published that Inoculated Small-Pox is always favorable,—never infecting,—so safe as to require no Physician,—the Pustules never exceed ten to a hundred, and do not pit!*

As the practice of inoculation grew in the liking of the people, there were, later, special houses or hospitals set aside in which the patients were kept while undergoing the treatment. Frequently friends and members of the family would retire together in order to enjoy one another's company during the rather lengthy space of time.

The accepted method whereby persons were inoculated might well be set down here. Pylarinus, one of the early inoculators, affected this way of proceeding:

They make a choice of as Healthy a Young Person as they can find, that has the Small-Pox of the best sort upon him, on the Twelfth or Thirteenth Day of his Decumbiture. With a Needle they prick some of the larger Pustules, and press out the Matter coming from them into some convenient Vessel or Glass (or the like) to receive it, which ought first of all to be washed very clean with warm water. A convenient quantity of this Matter being thus collected, is to be stop'd close, and kept warm in the bosom of the Person, that carries it (who ought to be some other Person, than what visited the Sick chamber for it, lest the Infection of the Small-Pox be convey'd in the Garment, as well as the Bottle, and the intended Operation be but by the Infection being conveyed first another way), and it should be conveyed as soon as may be to the Person that is waiting to be the Patient.

The Patient being in a warm chamber, is to have several small Wounds made with a Surgeon's Three-edg'd Needle, or with a Lancet, in two or more Places of the Skin (the best Places are in the Muscles of the Arm) till some drops of Blood follow: And immediately let there be dropt of a drop of the Matter in the Glass, on each of the Places; and mixed well with the blood that is issuing out. The Wound should be covered with half a Walnut Shell, or such concave vessel, and bound over that the Matter may not be rubbed off by the Garments for a few hours; And not let the Patient (having Fillets on the Wound) keep House, and keep warm, and be careful of his Diet; The Custom of Constantinople is to abstain from Flesh and Broth for Twenty Days or more. They chuse to perform the Operation either in the beginning of Winter or Spring.

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* "It would be idle in me, formally to confute these unguarded assertions, daily Experience evinces the Contrary."

It is hard, as far as we are away from that period, to look into the minds of the protagonists in the controversy and to try to evaluate their inner thoughts. We know now which side was right, but were they at the time fully justified in their stand? Was the opposition correct in their resistance to the new innovation? Of course, even if the anti-inoculators were right in their stand, that does not offset the fact that inoculation is the best thing. But if we are dispassionately to consider both sides, we must realize that Douglass had a cause and a basis for his opposing inoculation. As we look at the facts and try to judge from his writings, we reach the conclusion that Douglass probably was not inspired by any desire to save the world from a dangerous cult, but seemed to have his own selfish, personal purposes in mind. It is true that it seemed that a layman had encroached upon his field of medicine and to vain, conservative Douglass, this was an unforgivable act for which he determined to minimize the value of the discovery. It was too uncertain and new, he said, and the evidence too scant to justify the embracing of it immediately. After there was no hope that inoculation could be displaced, Douglass rescinded and gave his approval while withholding all approbation for the initiators. He was narrow, stubborn, conceited and not adverse to manipulating with facts if it would serve him any. But still he may have served some good. In our day we know how the average layman can become excited over some quack "cure" and how it is the doctor who brings him into line again. Somewhat the same conditions must have existed in those days with the laymen exploiting and the doctors scoffing. Mather did rely upon a couple of Oriental doctors of whose veracity and experimental skill he had no knowledge. He took much stock in the tales of negro slaves—notably unreliable. It just so happened that Mather did hit upon the right solution and pushed it through with his characteristic thoroughness.

Boylston, despite his background, would appear to be but a pawn in the hands of Mather, and although he did have ability, it was merely mechanical and he took his cue from Mather. Even Boylston's ability as an operator (inoculator) was questioned and when inoculation came into full use, his method was greatly improved by others.

He was a modest person and one upon whom Fortune had

bestowed a number of especially happy qualities. It seems that Fate picked a fine man to be the recipient of the honors due a pioneer in the advancement of a particular phase of medicine, and yet, aside from this, Boylston showed few of the requisites of a good medical research man as we consider one today. This may be considered as beating along the wrong track, but Boylston's place in the history of medicine is secure enough so that such criticisms as these hardly jar him. As Mumford says: "Boylston saw his occasion and seized it,—his hand turned to the need of the hour, his eye betimes on the distant future."

In the light of these developments in medicine we can safely say that inoculation was one of the notable advances in science which was aided materially by Puritan minds and Puritan deeds.

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IN COMMEMORATION OF THE ONE HUNDREDTH ANNIVERSARY OF THE FIRST APPLICATION OF ETHER ANESTHESIA

CRAWFORD W. LONG: THE PIONEER IN ETHER ANESTHESIA

HUGH H. YOUNG

From the James Buchanan Brady Urological Institute, Johns Hopkins Hospital, Baltimore

I appreciate immensely the honor of being invited to address this distinguished society. I presume the reason for asking me to talk on Crawford W. Long is because since my early days at the Johns Hopkins Hospital, I have interested myself in the work of this pioneer in ether anesthesia, and have presented various papers on the subject.

In 1896, while at my home in San Antonio on vacation, I chanced to meet Mrs. Frances Long Taylor. She asked me what interested me most at the hospital, and I told her, anesthesia. She surprised me by saying: "My father, Dr. Crawford W. Long, was the discoverer of ether anesthesia (Fig. 1)." Having been brought up on the idea so vigorously promulgated in Boston that anesthesia was the result of the work by Morton at the Massachusetts General Hospital, I was greatly surprised and asked: "Have you any proofs of your father's claims?" She told me that she had a trunkful of of letters and documents and that if I would come to her house she would gladly show them to me. I was there by nine o'clock the next morning and beheld an old leather trunk which was filled with case histories, letters, affidavits, etc. Eagerly delving into these, I discovered Doctor Long's original manuscript of his account describing the use of ether. When I asked Mrs. Taylor to allow me to take her documents to the Johns Hopkins Hospital and present them to the Hopkins Medical Society, she kindly consented.

Upon my return to Baltimore in September (1896) I found that a great celebration of the fiftieth anniversary of the discovery of ether anesthesia by Morton at the Massachusetts General Hospital was to

Fig. 1.

Portrait of Crawford W. Long by Lewis Gregg. This portrait, which hangs in the alumni hall at the University of Georgia, Athens, was painted from a crayon picture of Long at the age of 26, when he gave the first ether anesthetic.

be held the next month. Delegates from all over the world were assembled on October 16, 1896, in Boston, and several days were given in laudation of the work of Morton and the surgeon Warren who had operated upon the first patient. My chief, Doctor Halsted, said that he thought it would be very timely for me to present Doctor Long's original documents at an early meeting of the Johns Hopkins Hospital Medical Society.[1]

Long's Progenitors and Early Life

At the celebrated siege of Londonderry three brothers Long were among the patriots who held out for many months against the investing forces. Following the surrender of this Scotch-Irish stronghold in northern Ireland, more and more oppressive became the rule of the English. Finally about 1740, as a result of confiscatory taxes, large numbers of the people of northern Ireland began to leave for America. Among the first to go were two of the Longs who arrived in Pennsylvania with a considerable contingent of Scotch-Irish and settled in the Cumberland Valley among the Pennsylvania Dutch. I may be pardoned if I interject a little of the history of my own progenitors who also were driven out of northern Ireland and arrived in America about 10 years later. Finding the Cumberland Valley, where their friends previously had settled, fully occupied, they continued on down the valley along the Shenandoah and at its headwaters settled in the great county of Augusta, that immense tract of Virginia which extended west as far as the Pacific.[2]

In 1787 the group of emigrants from northern Ireland with which Samuel Long was prominently identified finally decided to leave Pennsylvania and settle in the fertile lands of northern Georgia. But on their migration they ran head on into a rebellion of the Creek Indians and were forced to camp temporarily in South Carolina where they planted crops and managed to eke out a bare existence for a year.

[1] This paper, "Long, the Discoverer of Anaesthesia: A Presentation of his Original Documents," was read before the Johns Hopkins Hospital Medical Society on November 8, 1896, and published (with additions) in the Johns Hopkins Hospital Bulletin, 8: 174-184, 1897.

[2] For more details concerning the Scotch-Irish settlers, see *Hugh Young: A Surgeon's Autobiography*. New York: Harcourt, Brace and Co., 1940.

Resuming their trek, they finally arrived and spread out in Madison County, Georgia, their chosen land. Here these industrious Scotch-Irish, working with great energy, cleared the woods and tilled the fields and soon prospered in their new homes. Chief of this band of adventurers was Samuel Long, the grandfather of the discoverer of ether anesthesia. With him was his son James, nine years of age. Mrs. Fanny Long Taylor in her book gives a vivid picture of the rugged life of these Scotch-Irish pioneers.[3]

The boy James grew up to be a highly intelligent and very prominent citizen. He acquired extensive plantations, was very influential in business and banking, took a great interest in politics and education, endowed an academy, and was said to be so well versed in law that he was frequently consulted by the bench and bar. His wife also was a person of marked intelligence and force.

To them was born at Danielsville (Fig. 2) a son on November 1, 1815 to whom they gave the name of Crawford Williamson. He was an active, precocious child. At the age of five, he accidently severed almost completely three fingers on the hand of his little sister with a hatchet. Instead of fleeing, as most children would have done, he grasped the bleeding members, pushed them back into position while his mother applied a bandage to hold them in approximation. His mother coated the fingers with sugar which, as all housewives know, is a remarkable preservative and preventive of decomposition. The effect must have been distinctly antiseptic and probably was responsible for the perfect healing of the wounds with no deformity of the fingers. Whether this incident, which must have been retold frequently in the family, fixed the thoughts of the growing child on medicine, we do not know.

With the advantages of the excellent school which his father had established, and brought up in a cultured home, young Crawford advanced so rapidly that at the age of fourteen he was admitted to Franklin College at Athens which subsequently became the University of Georgia (Fig. 3). Here Long's roommate was Alexander Stephens, who afterwards became the most distinguished man in Georgia. More remarkable is it that these two boys, Crawford Long

[3] Taylor, Frances Long: Crawford W. Long & the Discovery of Ether Anesthesia. New York: Paul B. Hoeber, 1928, 237 pp.

Fig. 2.

House near Danielsville, Ga., where Crawford W. Long was born November 1, 1815.

Fig. 3.

The University of Georgia at Athens (originally Franklin College), where Long graduated in 1835.

Fig. 4.

Transylvania Medical College. (From *The History of the Medical Department of Transylvania University*, by Robert Peter.[4])

and Alexander Stephens, were eventually chosen to represent their State in Statuary Hall at the Capitol in Washington. Long must have been a good student because he graduated at the age of a little more than nineteen years with the degree of Master of Arts. Returning to his home in Danielsville, he announced his desire to become a doctor, but his father decided that a year of teaching was desirable, and Long took the position of principal in the town academy and served for one scholastic year.

Long's Medical Training

At the end of the summer, having finished his year of teaching and several months in the study of medicine with his preceptor, Dr. George R. Grant, Long started across the mountain trails for the distant province of Transylvania, now the State of Kentucky. He traveled by horseback with his saddle bags stuffed with clothing and his rifle on his lap, because the intervening country was infested with Indians who often were on the warpath. He was on his way to enter Transylvania Medical College (Fig. 4), which was the second medical school organized in this country, the first being the University of Pennsylvania. From its beginning in 1799, the growth, at first slow, had recently been rapid and in 1836 there were 262 pupils.[4] The popularity of Transylvania was due to its distinguished faculty. The professor of surgery was Benjamin Winslow Dudley (Fig. 5), one of the great lithotomists of the world, having lost no patient in his first hundred cases, and only three in the two hundred and fifty-five he subsequently reported. In the nearby city of Danville the great Ephraim McDowell was the first to remove an ovarian tumor successfully. These two surgical pioneers were easily the greatest in the United States, and associated with them were men also celebrated in other departments of medicine. Although Long spent only one year at Transylvania Medical School, he must have been greatly inspired by Dudley.

From Transylvania, Long went to Philadelphia where he entered

[4] Peter, Robert: The History of the Medical Department of Transylvania University. Louisville: John P. Morton & Co., 1905. (Filson Club Publications No. 20.)

the medical school of the University of Pennsylvania in the fall of 1837 and remained there two years, graduating in 1839.

Long next went to New York, where he spent eighteen months in hospitals devoting himself largely to surgery.

Fig. 5.

Benjamin Winslow Dudley (1785-1870), professor of surgery at Transylvania Medical College when Long was a student there. (From *The History of the Medical Department of Transylvania University*, by Robert Peter.[4])

In the fall of 1841 he returned home and began the practice of medicine as an associate of his preceptor Doctor Grant, in the neighboring town of Jefferson. Within a few months Doctor Grant

accepted a call to Memphis, Tenn. The natural charm and intellectual qualities of Crawford Long soon made him a popular member of his community.

Ether Frolics

About this time itinerant lecturers were traveling back and forth across the United States discoursing on the marvels of chemistry and generally ending up with a demonstration of the exhilarating qualities of laughing gas (nitrous oxide). The story of the antics and amazing performances of members of the audiences who inhaled laughing gas on the stage at the invitation of the lecturer became widely known, even reaching the distant colony of Scotch-Irish in northern Georgia. A group of Long's young friends came to him to see if he could not supply them with laughing gas and give them an opportunity to enjoy frolics in the evening under its influence. Long told them that he frequently had inhaled nitrous oxide while at college, but that he had none on hand. He told them that he did have a supply of sulphuric ether, however, which he said would produce similar effects and that he himself often inhaled it and knew it to be free from danger. Thus began the ether frolics which occurred frequently of an evening in Doctor Long's offices.[5]

Discovery of Ether Anesthesia

These ether frolics resulted in Long's discovery of the pain-effacing effects of ether, his deduction that ether might be employed to rob surgery of its terrors, and the historic operations in which his deductions were shown to be true. This story has been so well told by Doctor Long that it seems best to give photographic reproduction of his first publication (Figs. 6 and 7).[6] As will be seen here at the ether frolics Long noticed that his young friends under the

[5] In a letter dated January 9, 1854 to the Honorable Junius Hillyer (member of Congress, House of Representatives when the ether bill came up), Long states that "the ether inhalation commenced in Jefferson in the last week in December, 1841. I noticed the fact that persons while etherized were not susceptible to pain. This fact I noticed frequently before I began to operate on patients under the influence of ether. . . ."

[6] Long, C. W.: An Account of the First Use of Sulphuric Ether by Inhalation as an Anesthetic in Surgical operations. South. Med. and Surg. J., 5 (new series): 705-713, 1849.

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PART FIRST.

Original Communications.

ARTICLE XXXVIII.

An account of the first use of Sulphuric Ether by Inhalation as an Anæsthetic in Surgical Operations. By C. W. Long, M. D., of Jefferson, Jackson Co., Georgia.

For nearly three years, the various medical journals have contained numerous articles on the employment of Sulphuric Ether by Inhalation, for the purpose of rendering patients insensible to pain during surgical operations.

The first notice I saw of the use of ether, or rather of Dr. Morton's "Letheon," as an anæsthetic, was in the editorial of the Medical Examiner for December, 1846, in which the editor gives the following extract from a paper by Dr. H. J. Bigelow, contained in the Boston Journal:—"The preparation (letheon) is inhaled from a small two-necked glass globe, and smells of ether, and is, we have little doubt, an etherial solution of some narcotic substance."

Having on several occasions used ether, since March, 1842, to prevent pain in surgical operations, immediately after reading this notice of "letheon," I commenced a communication to the editor of the Medical Examiner, for publication in that Journal, to notify the medical profession that sulphuric ether, when inhaled, would of itself render surgical operations painless, and that it had then been used by me for that purpose for more than four years. I was interrupted when I had written but a few lines, and was prevented, by a very laborious country

practice, from resuming my communication, until the Medical Examiner for January, 1847, was received, which reached me in a few days after reading the December number. It contained several articles, giving accounts of different experiments in etherization, in which surgical operations were performed without pain. On reading these articles, I determined to wait a few months, before publishing an account of my discovery, and see whether any surgeon would present a claim to having used ether by inhalation in surgical operations prior to the time it was used by me.

A controversy soon ensued between Messrs. Jackson, Morton and Wells, in regard to who was entitled to the honor of being the discoverer of the anæsthetic powers of ether, and a considerable time elapsed before I was able to ascertain the exact period when their first operations were performed. Ascertaining this fact, through negligence I have now permitted a much longer time to elapse than I designed, or than my professional friends with whom I consulted advised; but as no account has been published, (so far as I have been able to ascertain,) of the inhalation of ether being used to prevent pain in surgical operations as early as March, 1842, my friends think I would be doing myself injustice, not to notify my brethren of the medical profession of my priority of the use of ether by inhalation in surgical practice.

I know that my interests have suffered from not making an earlier publication, and I would not be persuaded at this late stage of the ether controversy to present my claim to being the first to use ether as an anæsthetic in surgical operations, if I were not fully satisfied of my ability to establish its justness.

In the month of December, 1841, or January, 1842, the subject of the inhalation of nitrous oxide gas was introduced in a company of young men assembled at night in this village, (Jefferson,) and several persons present desired me to prepare some for their use. I informed them that I had no apparatus for preparing or preserving the gas, but that I had a medicine (sulphuric ether) which would produce equally exhilerating effects; that I had inhaled it myself, and considered it as safe as the nitrous oxide gas. One of the company stated, that he had inhaled ether while at school, and was then willing to inhale it. The company were all anxious to witness its effects. The ether was introduced: I gave it first to the gentleman who had previously inhaled it, then inhaled it myself, and afterwards gave it to all persons present. They were so much pleased with the exhilerating effects of ether, that they afterwards inhaled it frequently, and induced others to do so, and its inhalation soon became quite fashionable in this county, and in fact extended from this place through several counties in this part of Georgia.

On numerous occasions I have inhaled ether for its exhilerating properties, and would frequently, at some short time subsequent to its inhalation, discover bruised or painful spots on my person, which I had no recollection of causing, and which I felt satisfied were received while under the influence of ether. I noticed, my friends, while etherized, received falls and blows, which I believed were sufficient to produce pain on a person not in a state of anæsthesia, and on questioning them, they uniformly assured me that they did not feel the least pain from these accidents. These facts are mentioned, that the reasons may be apparent why I was induced to make an experiment in etherization.

The first patient to whom I administered ether in a surgical operation, was Mr. James M. Venable, who then resided within two miles of Jefferson, and at present lives in Cobb county, Ga. Mr. Venable consulted me on several occasions in regard to the propriety of removing two small tumours situated on the back part of his neck, but would postpone from time to time having the operations performed, from dread of pain. At length I mentioned to him the fact of my receiving bruises while under the influence of the vapour of ether, without suffering, and as I knew him to be fond of, and accustomed to inhale ether, I suggested to him the probability that the operations might be performed without pain, and proposed operating on him while under its influence. He consented to have one tumour removed, and the operation was performed the same evening. The ether was given to Mr. Venable on a towel; and when fully under its influence I extirpated the tumour. It was encysted, and about half an inch in diameter. The patient continued to inhale ether during the time of the operation; and when informed it was over, seemed incredulous, until the tumour was shown him. He gave no evidence of suffering during the operation, and assured me, after it was over, that he did not experience the slightest degree of pain from its performance. *This operation was performed on the 30th March, 1842.*

The second operation I performed upon a patient etherized was on the 6th June, 1842, and was on the same person, for the removal of another small tumour. This operation required more time than the first, from the cyst of the tumour having formed adhesions to the surrounding parts. The patient was insensible to pain during the operation, until the last attachment of the cyst was separated, when he exhibited signs of slight suffering, but asserted, after the operation was over, that the sensation of pain was so slight as scarcely to be perceived. In this operation, the inhalation of ether ceased before the first incision was made: since that time I have invariably desired patients, when practicable, to continue its inhalation during the time of the operation.

Having so long neglected presenting my claim to the discovery of the anæsthetic powers of ether; for the purpose of satisfying the minds of all, of its justness, I have procured, I conceive, a sufficient number of certificates to establish the claim indisputably. I present, first, the certificate of James M. Venable, the patient on whom the first experiments in etherization were made, and no comments on it, I conceive, are necessary.

[Note.—A few months ago, Dr. Long informed us of his early attempts at etherization, in Surgery. He was then informed that any claim set up at this late day to priority of discovery, would be severely criticised, if not violently resisted; and that he had best, therefore, do all he could to fortify his position. He has accordingly sent us a number of certificates, properly attested; but as it is unusual for medical journals to admit these, and as besides, in our profession, the word of a gentlemen is sufficient on all points of controversy, these are of course omitted here. We state, however, they may be seen by any one curious in the matter, and their character may be judged of by the two following, bearing most pointedly on the subject under discussion.

We have only to add, that the writer of this communication is a highly worthy member of the medical profession, exceedingly modest in his pretensions and entitled to full credit for all he advances.]—Ed.

Fig. 6.

1 (CERTIFICATES.)

I, James M. Venable, of the county of Cobb and State of Georgia, on oath, depose and say, that in the year 1842, I resided at my mother's, in Jackson county, about two miles from the village of Jefferson, and attended the village academy that year. In the early part of the year the young men of Jefferson, and the country adjoining, were in the habit of inhaling ether, for its exhilerating powers, and I inhaled it myself frequently for that purpose, and was very fond of its use.

While attending the academy, I was frequently in the office of Dr. C. W. Long, and having two tumours on the side and rather back of my neck, I several times spoke to him about the propriety of cutting them out, but postponed the operation from time to time. On one occasion, we had some conversation about the probability that the tumours might be cut out while I was under the influence of S. ether, without my experiencing pain, and he proposed operating on me while under its influence. I agreed to have one tumour cut out, and had the operation performed that evening after school was dismissed. This was in the early part of the spring of 1842.

I commenced inhaling the ether before the operation was commenced, and continued it until the operation was over. I did not feel the slightest pain from the operation, and could not believe the tumour was removed until it was shown to me.

A month or two after this time, Dr. C. W. Long cut out the other tumour, situated on the same side of my neck. In this operation I did not feel the least pain until the last cut was made, when I felt a little pain. In this operation, I stopped inhaling the ether before the operation was finished.

I inhaled the ether, in both cases, from a towel, which was the common method of taking it.

JAMES M. VENABLE.

GEORGIA, Cobb county, July 22d, 1849. } Sworn to before me.

ALFRED MANER, J. P.

I certify that I was a pupil in the Academy in Jefferson, Jackson county, Ga., in the year 1842. Some time during the spring of that year I was present, and witnessed Dr. C. W. Long cut out a small tumour from the neck of James M. Venable. I am well acquainted with the smell of sulphuric ether, and know that Mr. Venable inhaled it, before and during the time of the operation. He made no sign of suffering pain during the operation; and after the tumour was cut out, he asserted that he did not feel any pain from the cutting out of the tumour.

2 A few months after this operation, Mr. Venable informed me that Dr. Long had cut out another tumour from his neck, while he was under the effects of ether, and that he did not feel any pain from the operation. Mr. Venable was a pupil in the Academy during the year 1842, and I was intimate with and heard him speak of the operations frequently, and he always asserted they were performed without pain. I know the operations were performed in the year 1842: my brother, Wm. H. Thurmond, had charge of the academy that year, and it was the only time I was a pupil in the academy.

August 21st, 1849. ANDREW J. THURMOND.

In addition to Mr. Venable's, I present the certificates of E. S. Rawls and Wm. H. Thurmond, who were present, and witnessed one or both operations.

* * * * * * * *

My third experiment in etherization was made on the 3rd July, 1842, and was on a negro boy, the property of Mrs. S. Hemphill, who resides nine miles from Jefferson. The boy had a disease of a toe, which rendered its amputation necessary, and the operation was performed without the boy evincing the least sign of pain.

I present Mrs. Hemphill's statement of the report the boy gave her of the operation on his return home, which I conceive is sufficient on this point.

* * * * * * * *

These were all the surgical operations performed by me during the year 1842, upon patients etherized; no other case occurring in which I believed the inhalation of ether applicable. Since '42, I have performed one or more surgical operations annually, on patients in a state of etherization.

The question will no doubt occur, why did I not publish the results of my experiments in etherization soon after they were made? I was anxious, before making my publication, to try etherization in a sufficient number of cases to fully satisfy my mind that anæsthesia was produced by the ether, and was not the effect of the imagination, or owing to any peculiar insusceptibility to pain in the persons experimented on.

At the time I was experimenting with ether, there were physicians "high in authority," and of justly distinguished character, who were the advocates of mesmerism, and recommended

3 the induction of the *mesmeric state* as adequate to prevent pain in surgical operations. Notwithstanding thus sanctioned, I was an unbeliever in the science, and of the opinion, that if the mesmeric state could be produced at all, it was only on "those of strong imagination and weak minds," and was to be ascribed solely to the workings of the patient's imaginations. Entertaining this opinion, I was the more particular in my experiments in etherization.

Surgical operations are not of frequent occurrence in a country practice, and especially in the practice of a young physician; yet I was fortunate enough to meet with two cases in which I could satisfactorily test the anæsthetic power of ether. From one of these patients I removed three tumours the same day: the inhalation of ether was used only in the second operation, and was effectual in preventing pain, while the patient suffered severely from the extirpation of the other tumours. In the other case, I amputated two fingers of a negro boy: the boy was etherized during one amputation, and not during the other: he suffered from one operation, and was insensible during the other.

I have procured the certificates of the lady from whom the tumours were removed and of her husband, who was present and witnessed the operations; and also that of the owner of the boy, establishing the fact of the insensibility of the patients to pain during these operations. These certificates were procured in preference to those establishing other operations, because they not only show that the experiments were continued from year to year, but also show that they were conducted so as to test the power of etherization.

* * * * * * * *

After fully satisfying myself of the power of ether to produce anæsthesia, I was desirous of administering it in a severer surgical operation than any I had performed. In my practice, prior to the published account of the use of ether as an anæsthetic, I had no opportunity of experimenting with it in a capital operation, my cases being confined, with one exception, to the extirpation of small tumours, and the amputation of fingers and toes.

I have stated that ether was frequently inhaled in this and

4 some of the adjoining counties, for its exhilerating effects; and although I am conscious that I do not deserve any credit for introducing its use for that purpose, yet as others, through their friends, have claimed to be the first to shew its safety, most of the certificates I have obtained establish the fact of its frequent inhalation for its exhilerating effects. I met with R. H. Goodman, who was present the night ether was first inhaled in Jefferson, and who removed to Athens, and introduced its inhalation in that place, and present his certificate. All the young gentlemen who were present the night I first administered ether, with one exception, are living, and their certificates can be procured, if necessary."

* * * * * * * *

I have now, in a very concise manner, presented a "plain, unvarnished" account of some of my experiments in etherization, and have said nothing of the comparative merits of ether, and the other anæsthetics, because that was foreign to my present subject. Had I been engaged in the practice of my profession in a city, where surgical operations are performed daily, the discovery would, no doubt, have been confided to others, who would have assisted in the experiments; but occupying a different position, I acted differently, whether justifiable or not. The result of my second experiment in etherization, was such as led me to believe that the anæsthetic state was of such short duration that ether would only be applicable in cases in which its effects could be kept up, by constant inhalation, during the time of the performance of the operations. Under this impression, up to January, 1847, I had not used ether, in but one case, in extracting teeth, and thus deprived myself of experimenting in the only class of cases which are of frequent occurrence in a country practice.

While cautiously experimenting with ether, as cases occurred, with the view of fully testing its anæsthetic powers, and its applicability to severe, as well as minor, surgical operations, others, more favorably situated, engaged in similar experiments; and consequently the publication of etherization did not "hide my time."

Fig. 7.

influence of ether narcosis struck themselves with violence against the furniture and other objects and afterwards, when he questioned them as to pain, asserted that they felt none, even though their shins frequently showed definite cutaneous wounds.

First Operation under Ether Anesthesia

It is not surprising that Long immediately deduced the fact that ether might be used to render patients insensible to pain during a surgical operation, and that he finally persuaded James M. Venable, who had participated in the ether frolics, to allow him to remove a small tumour from the back of his neck while he was under the influence of ether. This operation occurred in Long's office on the evening of March 30, 1842. Among Long's papers I found a sworn copy from his account book of the bill which he rendered to James Venable for the ether and the operations which he performed on March 30 and June 6, 1842:

James Venable

To Dr. C. W. Long, Dr.

1842	cts.
January 28, Sulphuric Ether	.25
March 30, Ether & Excising Tumour	2.00
May 13, Sulphuric Ether	.25
June 6, Exsecting Tumour	2.00

Georgia)
) I, P. F. Hinton, clerk of the Superior Court of said county,
Jackson County)

do certify that the above account is a correct copy of an original entry made in his Book for Medical services for the year 1842.

Given under my name and seal of office this 27th of March, 1854.

(Seal) (Signed) P. F. Hinton, Clerk S.

Another time-stained paper that I found in the old trunk was an account of his operation, as given by Mr. James M. Venable. This operation was done in the presence of four witnesses: James E. Hayes, A. T. Thurmond, W. H. Thurmond, and Edmund S. Rawls, the last of whom testified as follows:

Georgia,)
) I, Edmund S. Rawls, of Rome, Floyd Co., Ga., on oath depose
Clarke Co.)

and say that . . . on one occasion during that year (1842) I was present with James M. Venable in the office of Dr. C. W. Long in Jefferson, Jackson Co., Ga., and witnessed Dr. C. W. Long cut out a tumour from the side of neck of J. M. Venable while said Venable was fully under the effects of . . . s. ether inhaled from a towel, and without his exhibiting the least symptoms of suffering pain from the operation . . . J. M. Venable was so unconscious of the operation having been performed that he would not believe the tumour was removed until it was shown him. . . . .

(Signed) E. S. Rawls

Sworn to and subscribed before me this 2nd November, 1853.

E. L. Newton, J. J. C.

Here, then, was the first successful attempt to render a patient insensible to pain with ether and to carry out a surgical operation during this anesthesia. Although realizing the great importance of his discovery Long did not rush into print, but like a painstaking, modest scientist, quietly continued his work. He removed another tumor from the neck of the same patient a few weeks later, and then amputated a toe, also under anesthesia, in July. After that his meagre practice furnished him only a few surgical cases each year. He continued to carry out operations under ether anesthesia (which I found affidavits of) while he bided his time, waiting for a major operation before publishing his claims to a discovery which he well realized would revolutionize surgery and startle the world. During this period he administered ether to his wife at the time of the birth of their daughter Frances on December 27, 1845.[7] Doctor Long therefore was the first to use ether anesthesia in obstetrics.

[7] In a letter to H. H. Y. dated April 10, 1942, Dr. Frank K. Boland of Atlanta states: ". . . Crawford Long gave his own wife ether on December 27, 1845, at the birth of their second child, who was your friend, Mrs. Frances Long Taylor. I have a letter from Doctor Long's last surviving daughter, Mrs. Harper, who gave me these facts. She said that all her sisters and brothers had heard their mother say all their lives that Doctor Long gave her this anesthetic at this time. You will recall that Mrs. Taylor was the most active among Doctor Long's children and wrote a book about him. She never said anything about this event, however, because in so doing she would have divulged her own age, which she was loath to do. Her two sisters, Mrs. Eugenia Long Harper and Miss Emma Long, did not

While Long thus waited for a capital operation, Morton and the surgeons at the Massachusetts General Hospital on October 16, 1846 had rediscovered the value of ether and operated upon a small tumor of the neck. The publication of this work by Bigelow on November 18, 1846,[8] did not escape the quiet investigator of ether anesthesia in his remote country home in Georgia. As soon as Doctor Long saw an editorial in the *Medical Examiner* referring to Bigelow's report, he started to write a letter to the editor, but being called away by an emergency case and overwhelmed in practice, he never completed the letter.

About eighty miles away from Jefferson was the city of Augusta in which the Medical College of Georgia was situated. It had a distinguished faculty, among whom were Dr. Paul F. Eve, professor of surgery, and Dr. Louis Alexander Dugas, professor of physiology (Figs. 8 and 9). This medical school which was the first of importance in the eastern Southern states occupied a beautiful classic building (Fig. 10). It had from its inception played a very important role in medical education in the Southland. It was to this distinguished faculty that Doctor Long went in 1848 with the first public announcement of his work. In his presentation of Doctor Long, Doctor Eve, the professor of surgery, is reported to have said: "I introduce to you Dr. Crawford W. Long of Jefferson, whom posterity will honor as the very first man to apply practical anesthesia successfully." In response Doctor Long said as follows:[9]

> The first notice I saw of the use of ether, or rather of Doctor Morton's "letheon" as an anesthetic, was in the editorial of the *Medical Examiner* for December, 1846, in which the editor gives the following extract from a paper by Dr. H. J. Bigelow contained in the Boston journal. "The preparation is inhaled from a small two-necked glass globe, and smells of ether and is, we have little doubt, an etheral solution of some narcotic substance."
>
> Having on several occasions used ether, since March, 1842, to prevent

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tell about it until after Sister Fannie's death, because they were afraid of her." (See Mrs. Taylor's book,[2] p. 81, in which she says: "According to the testimony of my mother he administered it to her at the birth of one of her children about 1847.)"

[8] Bigelow, Henry Jacob: Insensibility During Surgical Operations Produced by Inhalation. Boston Med. and Surg. J., 35: 309-317, 1846-47.

[9] See Taylor, *op. cit.*

pain in surgical operations, immediately after reading this notice of "letheon" I commenced a communication to the *Medical Examiner* for publication in that Journal, to notify the medical profession that sulphuric ether, when inhaled, would of itself render surgical operations painless, and that it had been used by me for that purpose for more than four years. I was inter-

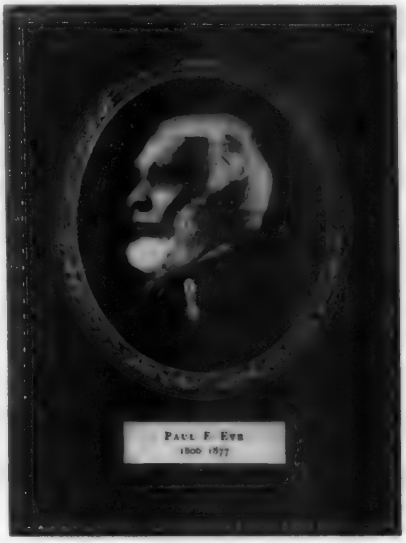


Fig. 8.

Dr. Paul F. Eve, one of the founders and professor of surgery for eighteen years at the Medical College of Georgia. He was editor of the *Southern Medical and Surgical Journal* from 1845-9.

rupted when I had written but a few lines, and was prevented by a very laborious country practice from resuming by communication until the *Medical Examiner* for January, 1847, was received, which reached me in a few days after reading the December number. It contained several articles giving accounts of different experiments in etherization, in which surgical operations were performed without pain. On reading this article I determined to wait for a few months before publishing an account of my discovery in order to learn whether any surgeon would present a claim to having used ether in surgical operations prior to the time it was used by me, but as no account

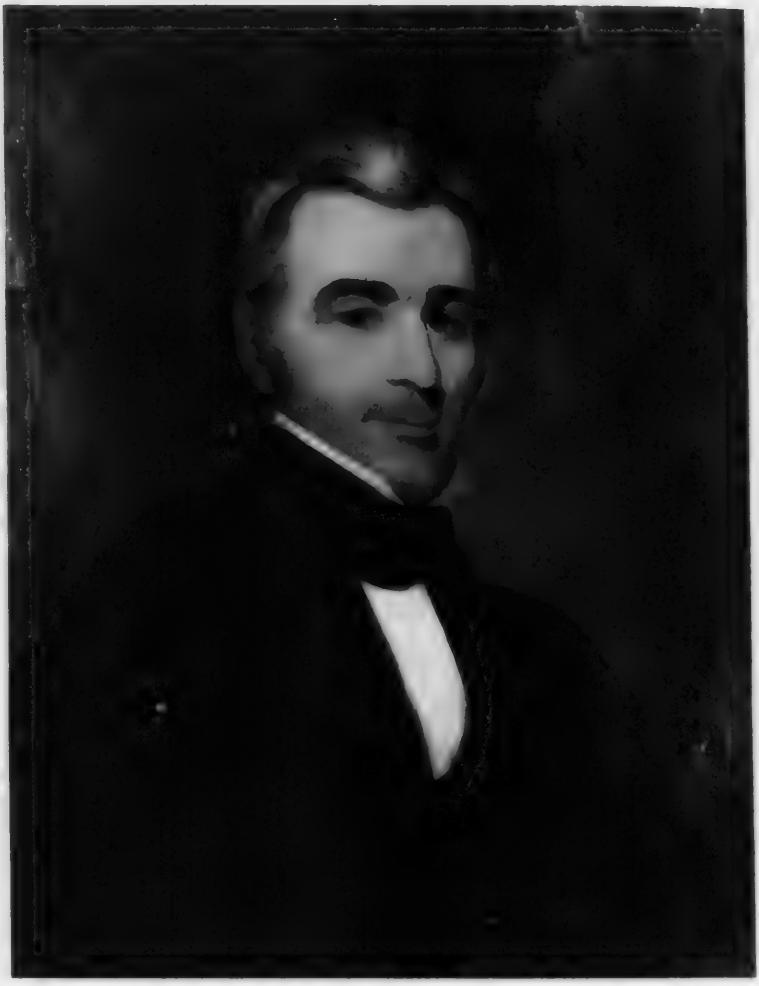


Fig. 9.

Louis Alexander Dugas (1806-1884).

His advocacy of mesmerism and his amputation of the breast of a woman under mesmeric sleep caused Doctor Long to withhold his announcement of ether anesthesia.

has been published, so far as I have been able to ascertain, of the inhalation of ether being used to prevent pain, in surgical operations as early as March, 1842, my friends think I would be doing myself an injustice not to notify my brethren of the medical profession of my priority in the use of ether by inhalation in surgical operations.

It was after his flattering reception at the Medical College of Georgia that Dr. Long prepared and published his first account of his work (Figs. 6 and 7).

Fig. 10.

Medical College of Georgia at Augusta, where in 1848 Long told for the first time the story of his discovery of ether anesthesia.

It is interesting to note that this same distinguished group of men who enthusiastically acclaimed Long's discovery in 1848 were the very same men who had caused him to delay his publication, for Dr. Paul F. Eve had written on mesmerism and surgical operations done under the mesmeric sleep.[10] Dr. Louis A. Dugas, professor of physiology and afterwards professor of surgery at this same Medical College of Georgia, was an ardent advocate of operations under mesmerism. Doctor Dugas was the first in this country to apply the test of a surgical operation to mesmerism. His first operation was done January 12, 1845:[11]

[10] Eve, Paul F.: Mesmerism. South. Med. & Surg. J., 1 (new series): 167-192, 1845.

[11] Dugas, Louis A.: Extirpation of the Mamma of a Female in the Mesmeric Sleep Without Any Evidence of Sensibility. South. Med. & Surg. J., 1 (new series): 122-125, 1845.

Two elliptical incisions about 8 inches in length were made, comprehending between them the nipple and a considerable portion of skin; the integements were dissected up in the usual manner and the entire mamma removed. It weighed 16 ounces. The ordinary dressing were applied. During the operation the patient gave no indication whatever of sensibility; she remained in the same sound and quiet sleep as before the use of the knife. When she awoke and was told that the breast had been removed, she expressed great incredulity.

At the insistence of his friends, Doctor Long presented to the Medical Society of the State of Georgia [12] a more comprehensive paper in which he succinctly outlined his reasons for deferring his publication, attributing his delay to the widespread publicity of the value of mesmerism which had been used very successfully in major operations, and his desire to operate upon a capital case under ether anesthesia before making his official report. He closed with the following remarks:

I know that I deferred the publication too long to receive any honor from the priority of discovery, but having by the persuasion of my friends presented my claim before the profession, I prefer that its correctness be fully investigated before the Med. Society. Should the society say that the claim, though well founded, is forfeited by not being presented earlier, I will cheerfully respond, so mote it be.

Not wishing to intrude upon the time of the Society, I have made this short compendium of all the material points stated in my article in the Journal, and if the Society wishes any fuller information on the subject I will cheerfully comply with their wishes.

At the conclusion of Long's presentation a committee of three was appointed to confer with Long and investigate his claims to the discovery in question. The following is the report of the committee: [13]

Resolved, That it is the opinion of this Society that Dr. C. W. Long, now of Athens, Georgia, was the first person who used Sulph. Ether as an anaesthetic agent in surgical operations; and as an act of justice to Dr. Long, individually, and to the honor of the Profession of our State, we recommend him to present his claims to priority in the use of this most important agent to the consideration of the American Medical Association at its next meeting.

In the meantime Doctor Long was quietly practicing his profession

[12] South. Med. & Surg. J., 9 (new series): 384, 1853.
[13] South. Med. & Surg. J., 9 (new series): 386, 1853.

in Athens, to which place he had moved in 1851 because of its superior educational advantages for his children (Fig. 11).[14]

The Debates in Congress over Ether

It was in Athens that Long was visited by Dr. Charles Thomas Jackson (Fig. 12) of Boston for the first time on March 8, 1854. In October 1846 Jackson had joined Morton in securing a patent for "Letheon," the name which these two had given to sulphuric ether, which was employed at the Massachusetts General Hospital in the operations done under that anesthetic, and published to the world by Bigelow.[15] The patent (No. 4848) was issued on November 12, 1846, but inasmuch as Morton did not succeed in enforcing the patent rights, he applied to Congress in 1849 for a grant of $100,000 for his discovery. Jackson, the friends of Horace Wells (who was then dead) and others contested the originality of Morton's discovery. Long was finally urged by his friends, who insisted that the only way to prevent the honor being given elsewhere, to write to Junius Hillyer, a member of the House of Representatives from Georgia, and Senator William Crosby Dawson, detailing his work. Senator Dawson sent Dr. Jackson to investigate Long's claims, a curious choice when it is remembered that Jackson was one of those who claimed to have discovered ether anesthesia. He explained to Long that he had heard of his work and begged to see the proofs of his priority. After spending two days in Athens, Jackson wrote a report of his findings confirming Long's claims to Senator Dawson.

After many months of deliberation by both the House and the Senate, the bill (S. B. 210) to compensate the discoverer of anesthesia was up before the Senate for passage. The claims of numerous aspirants for the honor had been presented, but the work of Crawford

[14] Doctor Long married Mary Caroline Swain on August 11, 1842. They had ten children, seven of whom grew to maturity: Sarah Frances, m. Dr. Marcus Elvis Taylor; Edward Crawford, m. Cora Celestia Stroud; Florence Cornelia, m. John Lowe Bartow; Eugenia Anna, m. A. O. Harper; Arthur B. Long, no record of his wife's name; Emma M., never married.

Doctor Long's son, Edward Crawford, was the only one who had children, two of whom are living: Edward Crawford Long, Athens, Ga.; Mrs Maude Long Baker, 1621 Main Ave., San Antonio, Texas.

[15] See Bigelow, *op. cit.*

Fig. 11.

Dr. Crawford W. Long's home on Prince Avenue, Athens, Ga.

Fig. 12.

Dr. Charles T. Jackson, who investigated Long's claims to the discovery of ether anesthesia, reported his investigations to Senator Dawson, resulting in a turning point of the great ether controversy in Congress.

W. Long had not been mentioned until Senator Dawson, on April 19, 1854, requested that Long's name be included among those who were to be named as the discoverers of ether anesthesia.[16] This was a momentous occasion in the great ether controversy, and proved to be a turning point on the deliberation of Congress. It seems desirable to reproduce a photostatic copy of the remarks made that day, some of which have been omitted for the sake of brevity (Fig. 13).

The letter which Jackson wrote to Senator Dawson has been lost,[17] but fortunately Jackson published later an account of his visits to Long.[18] In his letter, dated April 3, 1861, to the editor of the *Boston Medical and Surgical Journal*, Jackson says:

> From the documents shown me by Long, it appears that he employed sulphuric ether as an anaesthetic agent in (1) on March 30, 1842, when he extirpated a small glandular tumor from the neck of James M. Venable at Jefferson, Ga.; (2) July 3, 1842, in the amputation of the toe of a negro boy . . . ; (3) September 9, 1843, in the extirpation of a tumor from the head of Mary Vincent . . . ; (4) January 8, 1845, in the amputation of a finger of a negro boy . . . ; Copies of the letters and depositions proving these operations with ether were shown me by Long. . . . I waited expecting Long to publish his statements and evidence in full and therefore have not before published what I learned from him. He is a modest and retiring man, and not disposed to bring his claims before any but a medical or scientific tribunal. This he has done in the State Medical Society of Georgia. . . . Had he written to me in season I would have presented his claims to the Academy of Sciences of France. . . .
>
> Signed—Charles T. Jackson, M. D.

But the passage of the bill by the Senate to grant $100,000 to whomsoever should be adjudged the true discoverer of ether anesthesia did not put an end to the squabbles in Congress. As a matter of fact, the House of Representatives engaged in long and acrimonious debates. The President did not sign the bill. The

[16] Congressional Globe, 33 Cong., 1 sess. pt. 2, pp. 943-4, April 19, 1854.

[17] In a letter dated June 4, 1866 to the Honorable D. L. Swain of the University of North Carolina, Long says: "Mr. Dawson informed me that Dr. Jackson's admission of my claim was much stronger than the admission in the *Boston Medical and Surgical Journal*. He promised to furnish me with a letter of Dr. Jackson, but unfortunately soon after his health failed and he lived but a short time."

[18] Boston Med. & Surg. J., 64: 229-231, 1861.

Mr. EVERETT. I am desirous of asking the attention of the Senate this morning to Senate bill No. 210, to recompense the discoverer of practical anæsthesia. I move that the Senate proceed to its consideration.

Mr. EVANS. I hope that bill will not be taken up this morning. It requires some investigation. I have not yet given it that examination which I should desire to do. It is, I believe, considered a private bill, and I did not anticipate that it would be called up this morning; and, therefore, I am not prepared to present my views upon it.

Mr. EVERETT. I did not distinctly hear the Senator's objection. This is a bill which passed the Senate last year; and it is very much desired by the parties interested that it should be acted upon at an early day. I hope the Senator will withdraw his objection.

Mr. EVANS. I cannot withdraw my objection. I had no idea that the bill would be called up this morning. If I have the right, I object, therefore, to its being taken up out of its order.

Mr. WALKER. The motion of the Senator from Massachusetts, I suppose, is at the disposition of the majority of the Senate. I hope that the Senate will agree to the motion, and that the bill will be taken up. It is a subject which has been long before the Senate; and I think the Senator from South Carolina has not yet turned his attention to it, or he would not object to it. The bill has been as thoroughly investigated in both Houses of Congress as any other which has been before them for a number of years. I presume the Senate are prepared to vote upon it; and I should hope very much that we might now get a vote upon it.

The motion was agreed to; and the Senate, as in Committee of the Whole, proceeded to consider the bill.

The bill was reported from the Committee on Military Affairs with amendments.

The amendments of the committee were to insert the names of William T. G. Morton, Charles T. Jackson, and Horace Wells, as the probable discoverers; and to fill a blank in the bill, relative to the amount to be paid, with $100,000.

The amendments of the committee were agreed to.

The bill, as amended, recites that a discovery has been made, and is now in practice, whereby the human body can be rendered safely insensible to pain in dental, surgical, and obstetrical operations, by the use of what are commonly called anæsthetic agents, and the Government of the United States has been and is in the enjoyment of the discovery, in the military and naval service; and that it is believed that the discovery was made by some one of the following persons: William T. G. Morton, Charles T. Jackson, each of Boston, and Horace Wells, of Hartford, deceased; but it does not appear, to the satisfaction of Congress, which of those parties was the original, true, and first discoverer thereof; and as Congress is willing to provide a recompense for such discovery when ascertained, it proposes to appropriate $100,000, to be paid by the Secretary of the Treasury as a recompense for the discovery, and the use and benefit thereof by the Government and people of the United States.

It is to be the duty of the district attorney of the United States for the northern district of New York, within a reasonable time after the passage of the bill, to file in the circuit court of the United States for that district, sitting in equity, a bill of interpleader, wherein, reciting the act, or its substance, the Secretary of the Treasury, as trustee of the sum appropriated, shall be complainant, and William T. G. Morton, Charles T. Jackson, and the personal representative or representatives of Horace Wells, and any other person or persons who may make application to the court for that purpose, shall be defendants; of which bill those parties shall take notice, and may appear, and answer, and make proofs; and the circuit court is to have jurisdiction of the case, and it is to be tried according to the practice of the court, in equity cases; and the issue is to be, which one of the parties named was the original, true, and first discoverer of the discovery; and by final decree in such case, the court is to decide that issue, and direct that the sum of $100,000, without any costs, to be paid over to the party who shall be found to have been such discoverer, or to his personal representative or representatives or assignee.

Mr. DAWSON. I regret that I failed this morning to bring up some papers connected with this subject. I wish now to ask that the further consideration of the bill be postponed until to-morrow, in order that I may produce those papers. I have in my possession a letter from Dr. Jackson, and one from Dr. Long, of Athens, in the State of Georgia, on this subject. Dr. Long is a very young man, but he commenced his practice as early, I think, as the year 1843, and has, therefore, been over ten years in the profession. The evidence which I have will, I think, establish the fact beyond controversy, that this young man applied this discovery in the same form in which it is said to have been applied by one of the three individuals mentioned. I have forgotten his given name, or I would propose to insert it in the proper place.

Mr. EVERETT. It is provided for by the general provision allowing all persons to come in.

Mr. DAWSON. I know that, but I wish Dr. Long to stand among the four named in the bill as one of the individuals who, in all probability, made the first discovery. Perhaps it would be sufficient to put in "Dr. Long, of Athens, Georgia."

Mr. WALKER. I will state to the Senator from Georgia that I heard of this gentleman, and procured of Mr. HILLYER, of the House of Representatives, his name, and I thought I had it in my pocket, but I have lost it. The terms of the bill, however, are broad enough to embrace him.

Mr. DAWSON. But I wish to have him distinctly mentioned in both sections. I move, therefore, to insert the name of "Dr. Long, of Athens, Georgia," in every place in the bill, where the names of Dr. Jackson and Dr. Morton occur.

The amendment was agreed to.

The question being taken by yeas and nays on ordering the bill to be engrossed and read a third time, resulted—yeas 24, nays 13; as follows:

YEAS—Messrs. Adams, Bright, Brown, Chase, Cooper, Everett, Fessenden, Fish, Foot, Geyer, Johnson, Jones of Iowa, Jones of Tennessee, Pettit, Sebastian, Seward, Shields, Sumner, Thompson of Kentucky, Thomson of New Jersey, Wade, Walker, Weller, and Wright—24.

NAYS—Messrs. Allen, Atchison, Bradbury, Clay, Dawson, Dodge of Wisconsin, Evans, Fitzpatrick, Hunter, Mason, Rusk, Shdell, and Stuart—13.

The bill was then read a third time, and passed.

Fig. 13.

Excerpts of deliberations in U. S. Senate on April 19, 1854 concerning the ether controversy in Congress.

exasperated Morton was forced to bring suits in the civil courts to try to enforce his claims and prove the validity of his patent.

The sordid story of this long drawn out fight has been given frequently in detail, both by friends and opponents of Morton. Another recital has no place in this paper. Suffice it to say that the ether controversy ended disastrously for the three New England claimants. Wells was the first to go by his own hand in a prison on January 24, 1848, after having gone insane and thrown acid into the face of a prostitute on the streets of New York.[19]

In July 1868 Morton returned to New York from Washington in the wildest state of excitement. Driving in his buggy furiously up Broadway, he leaped out, and jumping over a fence in Central Park, fell down in a state of insensibility and was taken moribund to St. Luke's Hospital, where he died July 15, 1868.[20]

Jackson ended his days in an insane asylum on August 28, 1880.[21]

In marked contrast to the frenzied lives of the northern claimants, Long, after the presentation of his claims by Senator Dawson, made no further efforts to get recognition of his prior operations, but pursued the even tenor of his ways with a busy practice in Athens.

The Civil War

With the advent of the Civil War, Long joined the Confederate Army and took charge of a hospital on the University campus at Athens. His daughter Frances gives the following description of the final stages of the War in that part of Georgia:[22]

> One summer morning in 1864 General Stoneman, commanding a division of Federal cavalry, was nearing Athens. . . . A wounded young captain on horseback dashed to our door bearing the message from my father that the carriage must be packed with the silver and other valuables and that I was to accompany them . . . to his father's plantation home which was considered safe. The trusted coachman was away, hiding the horses in a swamp,

[19] Boston Med. & Surg. J., 38: 24-25, 1848.

[20] Morton, Elizabeth Whitman: The Discovery of Anesthesia. Dr. W. T. G. Morton and his Heroic Battle for a New Idea. How Painless Surgery Began Fifty Years Ago. McClure's Magazine, 7: 311-318, 1896.

[21] Dictionary of American Biography, edited by Dumas Malone. New York: Charles Scribner's Sons, 1932, vol. 9, pp. 536-7.

[22] See Taylor, *op. cit.*

so it devolved upon my little brother to act as driver. Just before starting upon our flight, my father came in bearing a glass jar containing a roll of papers which my father said "are most important. . . . They are the proofs of my discovery of ether anesthesia. . . . When you reach your destination, you will bury them in a secluded spot." Finally reaching our plantation home, I found an appropriate place where we dug a hole, buried the jar and covered the place with leaves.

Thus were saved Long's documents which I was allowed to see thirty years later.

After the War, Long received a signal honor from his former enemies when he was employed by the Surgeon General to attend the sick among the troops occupying Athens in 1867.[23] With the end of the reconstruction period, Long continued to practice medicine in Athens and the country around. Times were hard, the populace impoverished, and his life as a general practitioner very burdensome.

Long Recognized as Discoverer of Ether Anesthesia by J. Marion Sims

Long was getting along in years and struggling with a heavy practice, probably having lost interest in the question of obtaining recognition for his discovery when he received the following letter from the celebrated J. Marion Sims of New York (Fig. 14):

267 Madison Ave., New York
October 28, 1876

Dr. Crawford W. Long
Athens, Ga.

My dear Doctor,

My friend, Dr. Wilhite of South Carolina, told me a day or two ago about your using ether as an anesthetic in 1842, two years before the discovery of anaesthesia by Wells and four years before the use of ether by Morton. As I had just written a notice or sketch of Wells for Johnson's encyclopedia, I regretted not knowing the facts he related to me earlier. He also said that Morton or Jackson went to the South to see you on the subject of your claims as discoverer by priority of time in 1854 when he (Morton) was pressing his claims before Congress.

I will take it as a great favor if you will as soon as convenient give me the facts and dates, etc. connected with your labors in this matter, and if you

[23] *Ibid.*

have any published articles on the subject I would feel greatly obliged by the loan of them. I will return them in a few days.

Dr. Wilhite is sitting by me as I write these lines and he sends you his kind remembrances.

Thanking you in advance for your compliance with my request, believe me, my dear Doctor, most truly yours,

(Signed)—J. Marion Sims

Fig. 14.

James Marion Sims, renowned gynecologist whose presentation in 1877 of Doctor Long's claims was the first important step towards general recognition.

Long did as requested and sent a complete copy of his documents describing the operations and the testimony of those who had witnessed them.

Three months later, Sims wrote Long another letter in which he requested details on Long's life history for an article on Doctor Long which he was preparing for Johnson's *Universal Cyclopedia*. A third letter from Sims to Long, dated April 13, 1877, said:

. . . Please go to the best photographer in your town and have six pictures taken of yourself. They must be full length, standing, and what they call "imperial," i. e., about the length of this sheet of paper. Take them one full front; one full back; one three-quarter front, right side; one three-quarter front, left side; one profile, right side; one profile, left side. Now you naturally ask what under heaven does all this mean. I'll tell you what it means. The day will come when the State of Georgia will want a statue of you, and if we have the photographs as I direct it will be easy enough. The photographs must not be retouched by the artist. . . .

With data furnished originally by Dr. P. A. Wilhite and also by Doctor Long, Sims presented a lengthy paper in 1877 on the discovery of ether anesthesia by Long.[24]

Wilhite's Story of the Negro Boy Incident

In his paper, Doctor Sims told how one Dr. P. A. Wilhite of Anderson, South Carolina, in October 1846, informed him that he had assisted at the first operation ever performed under the influence of ether by Dr. Crawford W. Long in 1842. Wilhite had also told Sims that in 1839, at an ether frolic, he and some friends had forcibly anesthetized a negro boy with ether, and as he did not regain consciousness promptly, they became terror-stricken and sent for a doctor five miles away. The boy remained unconscious until the arrival of the doctor, but the latter slapped him vigorously and brought him to.

On May 20, 1877 Long wrote Wilhite as follows:

I received Dr. Sims' article on anesthesia yesterday and find several mistakes. . . . It was several years . . . before you entered my office. I wrote Dr. Sims, informing him of the errors.

Wilhite replied, admitting the mistakes. Doctor Long's daughter, Mrs. Frances Taylor, told me that her father frequently said that he had never heard of the "negro boy incident."[25]

Some years later (1893), after a careful survey of Long's documents, Luther B. Grandy declared after giving in detail the incidents relative to Wilhite's claims, that Doctor Long could not have received any assistance or suggestions whatever from young

[24] Sims, J. Marion: The Discovery of Anaesthesia. Virginia Med. Monthly, 4: 81-100, 1877.

[25] For a full discussion of the "negro boy incident," see Young, *op. cit.*

Wilhite.[26] And in a second paper (1895) he wrote in regard to Wilhite's claims:[27] "All of it I believe to be fiction, pure and simple—*falsus in uno, falsus in omnibus.*"

I have given these details concerning Wilhite's claims because in a recent book, *Triumph Over Pain*, by René Fülöp-Miller,[28] Wilhite's statements are given full credence and he is portrayed at great length, and in a motion picture on the discovery of anesthesia,[29] Wilhite and his claims are given precedence in the discovery.

Death of Crawford W. Long

A little more than a year after the publication of Sims's paper, Doctor Long, still practicing his profession, was attending a woman in labor. He administered ether to her, and when she was fully anesthetized, delivered the child. He then handed the baby to an attendant, and at that very moment had an apopleptic stroke and, according to his daughter, Mrs. Florence Long Bartow, fell across the patient's bed, completely unconscious. He was carried away to another room and died a few hours later on June 16, 1878. The child born that night to Mrs. H. H. Carleton was given Doctor Long's name. The burial services were from the M. E. Church, Athens, Ga. on June 17, 1878. The interment was in Oconee Cemetery.

Long was only 62 years of age when he died. His momentous life had been full of disappointment. He died in harness, and his last act was to apply his great discovery to relieve the pains of childbirth.

International Recognition of Long as Discoverer of Ether Anesthesia

Three of Doctor Long's daughters: Florence, Frances, and Emma, took upon themselves the task to see that their father's discovery

[26] Grandy, Luther B.: A Contribution to the History of the Discovery of Modern Surgical Anaesthesia, with Some New Data Relative to the Work of Dr. Crawford W. Long. Virginia Med. Monthly, 20: 577-588, 1893.

[27] Grandy, Luther B.: The Discovery of Anaesthesia, and the Alleged Relations Between Dr. C. W. Long and Dr. P. A. Wilhite. New York Med. J., 62: 79-81, 1895.

[28] Fülöp-Miller, René: Triumph Over Pain. Translated by Eden and Cedar Paul. Indianapolis and New York: The Bobbs-Merrill Co., 1938, 438 pp.

[29] A Pete Smith specialty entitled "Anesthesia," released in 1938 by Metro Goldwyn Mayer, Hollywood, Calif.

received worldwide recognition. The activities of these three women, especially Mrs. Taylor (Fig. 15), were indeed remarkable; the fruits of their labors extraordinary.

One of the first was an exhibition of Long's original documents at the British Medical Museum in connection with the 1910 meeting of the British Medical Association.[30] Drs. George Foy [31] and Dudley W. Buxton [32] have written important papers for foreign medical journals on Long's work.

Long's documents subsequently were placed in the Smithsonian Institution, Washington, D. C. Photostat copies are in the possession of the Medical School of the University of Pennsylvania, and Doctor Long's granddaughter, Mrs. Maude Long Baker of San Antonio, Texas. I have the Long family scrapbook, which was given to me by Mrs. Baker. This contains copies of his documents and letters. Other papers I sent to the Library of the Surgeon General.

Long's gun, which I got from the family, I gave to the Army Medical Museum, Washington. Dr. Frank K. Boland of Atlanta has his Duncan Phyfe table, his Waterford cut-glass tumbler and his gold-headed cane.

In 1910, a monument to Long was unveiled at Jefferson, Ga. (Fig. 16). This was the gift of Dr. L. G. Hardman.

The University of Pennsylvania erected a beautiful plaque by R. Tait McKenzie in 1912, the seventieth anniversary of Long's graduation (Fig. 17).

In 1921, a handsome monument with a replica of McKenzie's medallion on it was unveiled on the grounds of the University of Georgia at Athens (Fig. 18), the gift of Dr. Joseph Jacobs. Doctor Long's assistant at his drugstore.[33]

In 1926, a shaft to Long was erected at Danielsville, his birthplace. That same year a portrait of Long by Lewis Gregg made from a

[30] Brit. Med. J., 2: 241 (supplement), 1910.

[31] Foy, George: Crawford Williamson Long, M. D. The Discoverer of Ether Anesthesia. A Biographical Sketch. Janus, 5: 235-238; 285-293, 1900.

[32] Buxton, Dudley W.: Crawford Williamson Long (1815-1878). The Pioneer of Anaesthesia and the First to Suggest and Employ Ether Inhalation During Surgical Operations. Proc. Royal Soc. Med., 5: 19-45, 1912.

[33] Doctor Jacobs' little book (*Crawford W. Long*, Atlanta, 1919) gives a splendid account of Long's life.

Fig. 15.

Mrs. Frances Long Taylor, Doctor Long's second daughter, whose efforts in his behalf succeeded in obtaining for him world-wide recognition. At her birth in 1845, Doctor Long administered ether to her mother, the first use of ether in obstetrics.

Fig. 16.

Shaft erected in 1910 at Jefferson, Ga. to Dr. Crawford W. Long.

Fig. 17.

Bronze medallion by Dr. R. Tait McKenzie unveiled in the Medical Building of the University of Pennsylvania on March 30, 1912.

Fig. 18.

Monument to Crawford W. Long at the University of Georgia, Athens.

crayon picture of him when he was 26, the age when he first gave ether for an anesthetic, was placed in the alumni hall of the University of Georgia at Athens.

In 1907 the Legislature had picked Long and his roommate at Franklin College, Alexander Stephens, to be the honored sons of Georgia in Statuary Hall at Washington, and on March 30, 1926 John Massey Rhind's statue of Long was unveiled by Mrs. Frances

Fig. 19.

John Massey Rhind's statue of Crawford W. Long unveiled March 30, 1926 in Statuary Hall of the United States Capitol.

Long Taylor and Miss Emma Long (Fig. 19). Dr. Frank K. Boland, president of the Long Memorial Association, presided at the exercises. Addresses were made by: Dr. Joseph Jacobs, representing the pharmacists of America; Hon. Richard B. Russell, Chief Justice, Supreme Court of Georgia; Hon. George M. Napier, Attorney General of Georgia; Hon. William J. Harris, Senator from Georgia; Dr. George W. McClellan, of the University of Pennsylvania; Hon. Rebecca Latimer Felton, former Senator from Georgia; Dr. William Hamilton Long, secretary of the Southern Association of Anesthetists; Miss Virginia Gibbes, representing the Georgia Association of

Fig. 20.

Statue of Crawford W. Long unveiled in 1936 at his birthplace, Danielsville.

Graduate Nurses. In this program I had the honor of representing the medical profession, and presented a lengthy review of the life and accomplishments of the great discoverer of ether anesthesia.[34]

At the celebration of the hundredth anniversary of Long's graduation from Franklin College at Athens, I again was requested to be the principal speaker. The program began in the stately Grecian chapel of the old college. From there the celebrants moved over to Danielsville, where a replica of Rhind's statute was unveiled (Fig. 20). The final exercises were held before the tiny old office building at Jefferson in which the gay ether frolics were held, and the first operation under ether anesthesia performed by Doctor Long on March 30, 1842 (Fig. 21). On the way back to Athens we visited the modest country house in which he was born (Fig. 2).

This anniversary celebration, which was participated in by distinguished medical men, the governor and other officers of the State, and professors of the University of Georgia, was indeed an impressive demonstration of the veneration in which the name of Crawford W. Long is held by the citizens of his native state.

That same year a plaque of Long was accepted by the University of Edinburgh from the Southern Society of Clinical Surgeons.

In 1940, the U. S. Government issued a commemorative postage stamp on which Doctor Long's picture (Fig. 22) was reproduced.

SUMMATION

In this paper the following facts have been established:

Crawford Williamson Long frequently held ether frolics in his office at Jefferson, Jackson County, Georgia, during the winter of 1841-42. From injuries which he saw his friends receive while they were under the influence of ether, he was inspired to try this drug to eliminate pain in surgical operations.

On March 30, 1842 Crawford Long administered sulphuric ether to James M. Venable until he was unconscious and then removed a tumor from his neck while he was under the influence of ether. Later Long removed another tumor from Venable's neck, and during

[34] Proceedings in Statuary Hall of the United States Capitol upon the Unveiling and Presentation of the Statue of Crawford W. Long by the State of Georgia, March 30, 1926. 69th Cong., 1st sess., Senate Document No. 160.

Fig. 21.

Tablet erected in 1936 at Jefferson, Ga. Left, Dr. Frank K. Boland of Atlanta, president of the Long Memorial Association; right, author of this article.

that year and for several years afterward, he continued to operate upon patients under ether narcosis.

Long constantly deplored the fact that all of these were minor operations and eagerly awaited a chance to employ the drug in a major case. The reason he delayed publication of his discovery of ether anesthesia was because Dr. Louis A. Dugas of Augusta, Georgia, was vigorously championing mesmerism for surgery and had actually removed the breast of a woman without her being aroused.

Fig. 22.

Picture of Crawford W. Long made in 1877, when he was about 55 years of age.

While Long waited, others in Boston employed sulphuric ether to remove a similar small tumor from the neck on October 16, 1846, and their work was reported in a Boston medical journal without delay. Long, upon reading this article, realized that he had lost the priority of publication of his discovery of ether anesthesia. It was not until two years later that he presented to the Medical Department of the University of Georgia the proof of his discovery in 1842.

No one can deny that the adoption of ether for surgical operations came from the wide publicity in Boston in 1846. Nevertheless, Long had fully realized the importance of his great discovery. Had he been less retiring and more self-seeking, the announcement of the anesthetic properties of ether probably would have been given to the world in 1842.

A SYMPOSIUM ON GALILEO IN COMMEMORATION OF THE THREE HUNDREDTH ANNIVERSARY OF HIS DEATH

GALILEO GALILEI

And His Influence on the Evolution of Medical Thought

ARTURO CASTIGLIONI

Galileo Galilei came from a family well known in Italian medical annals. An early kinsman, also called Galileo Galilei (1370-1446) was a famous physician of the 15th century. This man's epitaph in Santa Croce praises him as a great philosopher and prominent doctor. To him the Florentine Republic had entrusted the treatment of Giovanni d'Appiano, the young Duke of Piombino, and in the year 1438 he was called to the chair of medicine in the University of Florence and to some important offices of the Republic. Many other ancestors of Galileo had had the high office of Prior. His father, Vincenzio, was a scholar, a writer and a musician, the first to give a new form of musical expression to verse. The history of music mentions him as one of the few who in the 16th century prepared the Renaissance of light Italian music, and Johannes Kepler cited his work with gratitude and with deep appreciation.

Galileo, born in Florence on Feburary 16th, 1564, some days after the death of Michelangelo, enjoyed the inheritance of a patrician family which belonged to the brilliant, intellectual society of the Florence of the Renaissance. We know that after preliminary education in the cloister school of Vallombrosa, he was enrolled on September 5, 1580 in the Faculty of the Artists of the University of Pisa. For three years he was a student of medicine, following the advice of his father, who, perhaps, had given him the name of the great ancestor in the hope that he would become a great physician.

Medicine at this time was in one of the most significant stages of its development, and a new trend in medical thoughts was outlined in all fields, but especially in anatomy and physiology. The book of

Vesalius, whose teaching in Pisa has not been forgotten, had had an immense repercussion throughout the scientific world. Girolamo Fracastoro, an astronomer and humanist, one of the most outstanding personalities of the Renaissance, was well known all over Italy as a great pathologist and a prominent scholar. At the school of Pisa itself, Andrea Cesalpino of Arezzo, founder of the Botanical Gardens, had been the creator of a new philosophic system.

Cesalpino was an Aristotelian in the fundamental principles of his reasoning. He was considered, however, by his pupils as the "innovator" of Aristotle; by Linnaeus, the first of the systematists; by Cuvier, the creator of new doctrines in mineralogy. In opposition to Galen he accepted a single principle as responsible for all cosmic phenomena and one analogous principle in man by which all functions of organic and psychic life are governed. This principle he called *anima*. He thought that this anima, one and indivisible, ruled all the functions of the body. Its site, according to Cesalpino, was the heart, and the animating thought materialized its power through the heart, and by means of heat. The heat was spread throughout the body by the blood, and from all the parts of the body it returned to the heart as its origin. This philosophic conception gave rise to the principle of circulation of blood, a term which was used for the first time in history by Cesalpino. The arteries and the veins which had to convey the blood from the heart and to the heart he considered merely as a continuation of the heart. Attacking the Galenic concepts which considered the liver as the center of the movement of the blood, he started from a concept which was fundamentally correct, even if it must be admitted that he had not an exact idea of the circulation and that he was not able to provide the proof.

It is very difficult to say if and how far the teaching of Cesalpino may have influenced Galileo. Certainly his doctrine was widely known and greatly discussed at Pisa where the authority of the great botanist and physiologist was much esteemed. It is sure, however, that Galileo's inclination toward experimental science does not derive from Cesalpino. In his school Aristotle was revered as an absolute authority and experiments were neither requested nor accepted.

Galileo's student lecture notes form a very revealing document. They show how slowly the anti-scholastic current which began to

arise at the Italian Universities took Galileo along with it. Evidently he could not obtain from his medical teachers the solution of the problem which his intelligence was facing. Love for exact studies was instilled in him by Ostilio Ricci, the professor of mathematics whose classes he attended with great diligence, neglecting as he said himself, Hippocrates and Galen, and beginning independent research and experiments.

It was during Galileo's sojourn in Pisa that the well known episode of the swinging lamp in the Cathedral occurred. The verity of this story, told by Viviani, the pupil and biographer of Galileo, has been greatly discussed. In any case it is sure that Galileo's observation of the oscillations of the pendulum led him to the discovery of the isochronism, and he immediately applied the new principle to the timing of the pulse, an idea which later received practical embodiment in Santorio's pulsometer.

Before he was twenty-five he published his work on the hydrostatic balance and on the center of gravity of solids. The experiment in falling bodies which he conducted at the Leaning Tower of Pisa revolutionized the scholastic doctrine showing that velocity is not proportional to weight. He further proved that the most important fact in the study of motion is the relation between space, time and velocity. This work and this demonstration marks a historical date in the evolution of experimental science and prepared the way for Newton's discovery of the law of gravitation.

Although Galileo abandoned his medical studies, his connection with medical students and physicians was a lasting one. The sharp contests between Galenists and scholars who tried to follow the way of objective research is narrated by Galileo in his dialogues on *Two New Sciences*. One of the characters, Sagredo, recounts the following episode: Once at the home of a famous doctor he witnessed a demonstration of the origin of the nerves in the brain. A well known peripatetic philosopher was present. After the dissector had meticulously demonstrated the verity of his assertions, he asked the philosopher: "Are you now convinced that the nerves have their origin in the brain and not in the heart?" The philosopher, after some meditation answered: "You have demonstrated everything so clearly and evidently, that if that would not be contradicted by the expressed saying

of Aristotle, that the nerves arise from the heart, one should necessarily accept that you are right."

We don't know exactly what reason persuaded Galileo to abandon Pisa for Florence and to long for Padua. When he was called to the chair of mathematics in this town (1592), where he spent, according to his own words, the eighteen most delightful years of his life, the University was no longer at the height of its glorious period. He began his teaching at the Faculty of the Artists in which a crowd of students from all parts of Europe was enrolled. The fame of Padua as a center of medical studies had not yet diminished. Nicolas Copernicus had stayed for a long time in Italy and had studied medicine at Padua contemporaneously with Girolamo Fracastoro, the founder of the doctrine of contagion through germs. At the same time in which the epoch-making book of Vesalius had appeared, the book of Copernicus, *De Revolutionibus Orbium Celestium,* was published. When Galileo came to Padua, the school of anatomy was still flourishing. Fabrizio d'Acquapendente, one of the most remarkable men of the Renaissance, had begun his biological research. He was an expert surgeon and an erudite anatomist and his book, *De Formato Foetu,* full of original observations, laid the basis for modern embryology. He studied the relationship existing between all the phenomena of animal life and the supreme laws which govern them. The embryonic evolution of birds, reptiles and mammals, the morphology of placenta and embryo in different kinds of animals were the objects of his research and of his comparative studies. With the discovery or with the new anatomical description of the valves of the veins he made important progress in the doctrine of the circulation. Fabrizio, Girolamo Mercuriale, the great clinician, Fortunio Liceti, the philosopher and pathologist and Prospero Alpino the pharmacologist were among Galileo's friends.

Foreign students attended Galileo's lectures in Padua in such great numbers that sometimes the largest amphitheater of the Faculty of the Lawyers was not sufficient to contain them; many had to stand. There were present not only members of reigning houses in Europe, but also the intellectual aristocracy of Germany, England, France, Holland and many other countries. William Harvey was among them.

The lectures on mathematics had to be held at a time in which no other lectures for students of medicine were scheduled, and it is obvious that the medical students were expected to attend them regularly. From Galileo's writings we learn that the greatest part of the audience was made up of medical students; medical students were among the many who had private lessons with him, asking his advice on physical and mathematical and perhaps astrological problems and among those who lived as boarders in his house. Medical astrology was no longer officially in favor, however, it was expected that the physician should be able to speak and to understand something about the position and the connection of the stars.

The scientific work and astronomical discoveries of Galileo during his sojourn in Padua are so widely known that I need not speak of them here. I want only to emphasize the fact that he adopted the telescope of his own construction and improved it until he obtained a power of 32 magnifications. Soon his instruments were in demand in every part of Europe. In his work *Sidereus Nuncius* he now publicly proclaimed the verity of the Copernican doctrine, derived from the discovery of the phases of Venus and the satellites of Jupiter, and he decisively and definitely affirmed his position against Aristotelian dogmatism. The application of the telescope to astronomy was the occasion of an epoch-making revelation in establishing the true systems of the universe.

Galileo was the first to break away courageously from the physics of the classic school. Perhaps he was not the first to point a telescope to the sky, but it is sure that he was the one who was able to understand what he saw, to draw the correct conclusions from his observations, to explain them and teach them in a clear way. The Aristotelians attacked him very severely. He wrote to Kepler: "Dear Kepler, what peals of laughter you would give forth if you heard with what arguments the foremost philosopher of the University opposed me, with his logic-chopping argumentations as though they were magical incantations wherewith to banish and spirit away the new planets out of the sky."

For Galileo there is no contrast between Biblical dogmatism and objective scientific knowledge, or if such a contrast exists the decision is necessary and evident. The verity of God's revelation is written

in two books: in the Bible and in the book of Nature. The Bible may be interpreted, however, at different times and by different people in various ways. The book of Nature is open to all and may be understood by those who are able to perceive mathematical figures and mathematical laws. "Why should we, therefore, study the universe and its parts beginning with the word of God instead of beginning with His work, or is perhaps the work less noble and excellent than the word? What is given us in true experience or what is taught by conclusive demonstration never can be questioned by any argument taken from the Biblical text, for not every word of the Scriptures is bound to such severe precepts as every effect in nature." This courageous affirmation, contained in the famous letter to his friend Benedetto Castelli was brought before the Tribunal of the Holy Inquisition as the decisive proof of Galileo's heresy.

The new dynamics, the science which was founded by Galileo, proved that nature obeys, as Leonardo had ascertained, the law of necessity, and is bound up with universal and inviolable principles. Motion is no longer as it was believed by the Aristotelians a changing phenomenon, but it belongs to the mathematical laws which have to be proved by experiment and explained by reasoning. "It called for an extraordinary genius," says LaGrange in his *Mechanique Analytique,* "to detect the laws of nature in such phenomena as in all times had been evident, but the explanation of which had always escaped critical thought." Galileo no longer searched for philosophical explanation which he calls *mere words,* but he investigated the relations between the mathematical facts and the mathematical laws, between space, time and velocity. He studies the problem, quoting the words of E. Kant, "not in the character of a pupil who agrees to everything the master says, but as an appointed judge who compels the witnesses to answer the questions which he himself proposes."

The history of experimentation certainly began before Galileo and Leonardo may be referred to as one of the first who understood and practically demonstrated the importance of experiment in the field of mechanics. They were however only isolated experiments and attempted to give the explanation of single facts or the proof of single laws. Leonardo was a prophet: he saw far beyond the limits of human knowledge. But he was a solitary thinker, who faced and

solved alone the problems which appeared before his mind, with the intuition of his genius. Galileo was essentially a teacher, who felt the necessity to proclaim clearly and courageously the results of his studies, and to establish definitely a system of scientific research and of philosophical reasoning. The appreciation of the possibility of experiment as a scientific tool and the methodology of it started really from Galileo. He began to employ empirical knowledge in order to discover the laws; the experiment is taught as the only means to find out, to synthesize, and to prove with the help of correct reasoning the general law which may be induced from the facts observed. The law of nature is one and inviolable, because nature always acts in the same way. From this statement derives the fundamental conclusion that the laws are eternal and that, to quote his own words, "by the mutual support of observable facts and of demonstrable mathematical propositions the image of reality appears which proves to possess a unique sense and a necessary truth." Truth is therefore unique and necessary, and the distinction between imminent and transcendent truth is denied in a definite way. Verity is divine and human at the same time. The right way to attain truth is "to put experiment before and above all discussion. Any sort of logic is permitted, but the final test must be the experiment and not the authority of the master."

The work of Galileo is completed by the discovery of the microscope which he first outlined and used for the examination of organic objects. Research in the laws of nature through observation and experience required necessarily the perfecting or at least improving of the sensory organs. The telescope and the microscope made it possible to study things infinitely distant and things infinitely small which reveal to the scholar the mathematical figures in which they are written.

The reasons which brought Galileo in an open conflict with the Inquisition, the history of his trial and of his final condemnation have often been told not without romantic flourish. On June 22nd 1634, the Tribunal declared the heliocentrical doctrine to be heretical and Galileo had to recant and was sentenced to incarceration at the pleasure of the Tribunal. The judges doubtless believed that they had saved the dogma, which had been defended with all means.

* * *

Galileo's conception of mechanics reacted swiftly on the biological sciences. It had a forceful impact on the development of experiment in the direction which he had taught, following his conception of the cosmos and his doctrine. The principle that well-defined mathematical laws rule alike the movement of the heaven, the changes of the earth, the revolutions of the satellites and the functions of the human body gave origin to a new conception in medicine, to a new method in the study of the functions of the organs and the tissues, to a great school which had a prominent and lasting influence on the evolution of medical thought.

At the time when the fame of Galileo was at its height and he was revered as the most illustrious teacher of the University and the founder of new means of inquiry, William Harvey came to Padua (1598). He became the pupil of Fabricius, and followed with greatest interest his teacher's studies on circulation in the vessels and on generation. Galileo, Fabrizio, and Paolo Sarpi were close friends, and Harvey surely belonged to the students who were familiar with this circle. Paolo Sarpi, the wise friar, was the most authoritative counselor of the Republic and was fiercely opposed by the Vatican. To him, Galileo, who considered him as the most learned mathematician he knew, reported first on his new experiments. Sarpi was deeply interested in the problem of the circulation and many contemporaneous authors believed that he had an important part in the discovery of the valves of the veins. Among his books, found after his death, there was a manuscript copy of Harvey's book.

It can not be doubted that Harvey had been in contact with this group of men who were studying the problem to which he devoted his attention and as a diligent pupil he surely attended Galileo's lectures and was acquainted with his astounding discoveries about motion and its laws. As a matter of fact the studies of Harvey were directed to solve the problem of motion; Galileo's revolutionary experiments had taught the laws of motion of the bodies and the stars. Harvey faced the problem of the motion of the heart and the blood. In the dedication of his classical book he wrote, " Having now for nine years and more confirmed my new views of the motion and function of the heart by multiplied demonstration and illustrated them by arguments and freed them from objections, I yield to the

requests of many and present them for general consideration." He really applied the principles of Galileo. For many years he continued his experiments on animals. His argument is essentially a physical, mechanical one; the problem that he puts before himself to solve is, as Foster says in his masterly *History of Physiology*, essentially a mechanical physical problem. The solution at which he arrived is a mechanical solution of the phenomena of the circulation. In the minds of those before him this problem was mixed up with theological questions as in the book of Servetus, or with philosophical discussions (Cesalpino) about the distribution of the various kinds of spirits, the natural, vital and animal spirit, but Harvey as Galileo had taught, believed that these are only *puri nomi*, mere words, and he did not deal at all with them. He tried and experimented searching for mathematical figures and he created the new doctrine of the circulation as a mathematical and a physical doctrine. Hume, the great English historian affirms that on the evolution of science in England in the 17th century the work of Galileo has a decisive influence and it marked a new epoch. We believe that in the work of the greatest of the English physiologists and experimentalists the impact of the discoverer of the law of motion is very clearly demonstrated. At the same time in which the work of Galileo destroyed the Aristotelian doctrine of the permanent regularity and immutability of the heavens and put the sun in the center of the Universe, Harvey destroyed the hitherto dominant Galenic dogma of the movement of blood in the organism and put the heart in the center of circulation.

Two other pupils of Galileo were among the first to apply his principles in the field of medical research. At the same University in Padua in which Galileo taught, Santorius Santorio, who belonged to the circle of scholars and humanists which gave a remarkable impulse to the activities of the school, introduced the method of physical experimentation in the study of physiology and pathology of the human body. In 1614 Santorio published his book "*De Statica Medicina*," in which he tried to evaluate the importance of the perspiration, that is the respiration through the skin of the whole body, which Galen had spoken of as *diapnoe*, by exact measurements. The "previously unheard of" invention of Santorio consisted of the use of a scale as an instrument of control. He placed his bed, his work

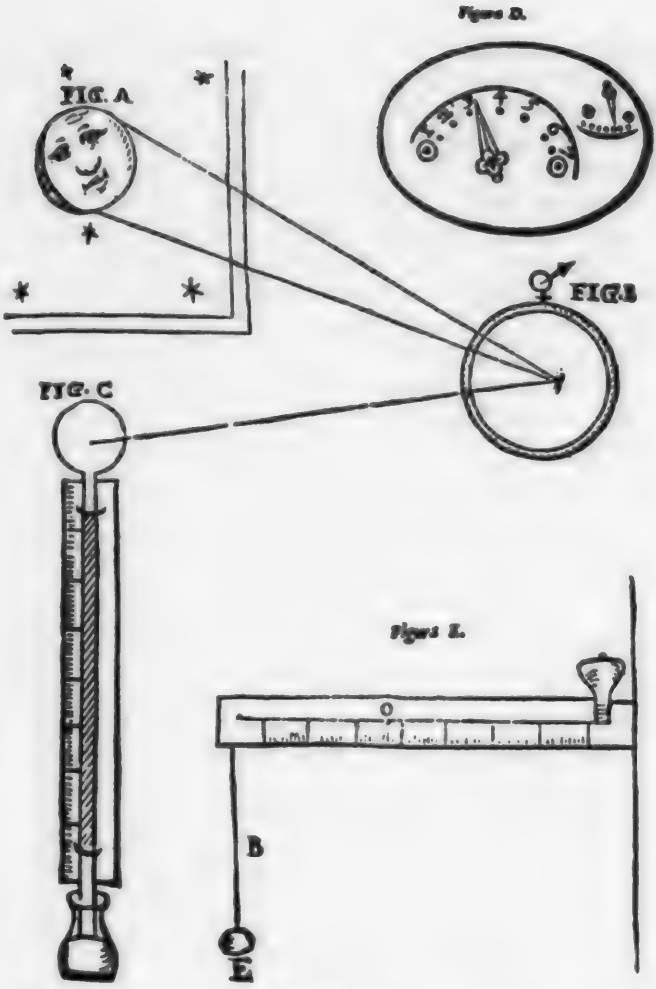


Fig. 1.

The thermometer of Galileo. The rays of the moon (A) reflected on a mirror (B) acting on the bulb of the thermometer (C).

Fig. E. The Pulsilogium. The use of a pendulum for timing the pulse.
Fig. D. An index to mark the difference in the frequence of the pulse.

(Sanctorii *Commentaria*, Venice 1660)

table and all necessaries on a specially constructed balance, and investigated the alteration in his body weight produced by solid and liquid secretion in various normal and pathological conditions. In this way he proved the existence of insensible perspiration. He continued his experiment for more than thirty years during the time in which Galileo was teaching at Padua. The book in which he reported his experiments had extraordinary success. The author offered a copy of it to Galileo with a letter of dedication from which we are able to see how he considered him as his teacher. But also in another field Santorio was a pupil of Galileo. The latter had invented and described a simple air thermometer (1592) of considerable sensitiveness, but very difficult to use. Santorio constructed a thermometer with which it was possible to measure the temperature of the body very conveniently. He also invented the pulsometer or *pulsilogium* which derived directly from the first conception of Galileo of timing the pulse in accordance with the pendulum. The instrument consisted of a pendulum suspended by a thread which could be shortened or lengthened in order to adjust the vibration of the pendulum to the same rate as the beating of the pulse. An index marked on a strip of metal along which the pendulum was moved made it possible to make useful comparisons and give exact indications for medical purposes. Santorio was the founder of the iatromechanical school which had such illustrious followers as Boerhaave and Baglivi. His work was translated into many languages, read and commented till the end of the 18th century, and constitutes one of the first and most courageous efforts in systematic experimental medicine.

Another famous leader of the iatromechanical school was Giovanni Alfonso Borelli, a pupil of Galileo, who, however, apparently never attended his lessons personally. We know, however, that Borelli, born in Naples in 1608, had studied mathematics in Rome under Benedetto Castelli, Galileo's pupil and friend and he desired so ardently to listen to his voice that in 1642, with the consent and at the expense of the University of Messina where he was teaching, he went to Florence to see Galileo. Very unfortunately, soon after his arrival Galileo died, and Borelli after having passed sometime in Florence with Torricelli, Galileo's pupil and spiritual heir, returned to Messina.

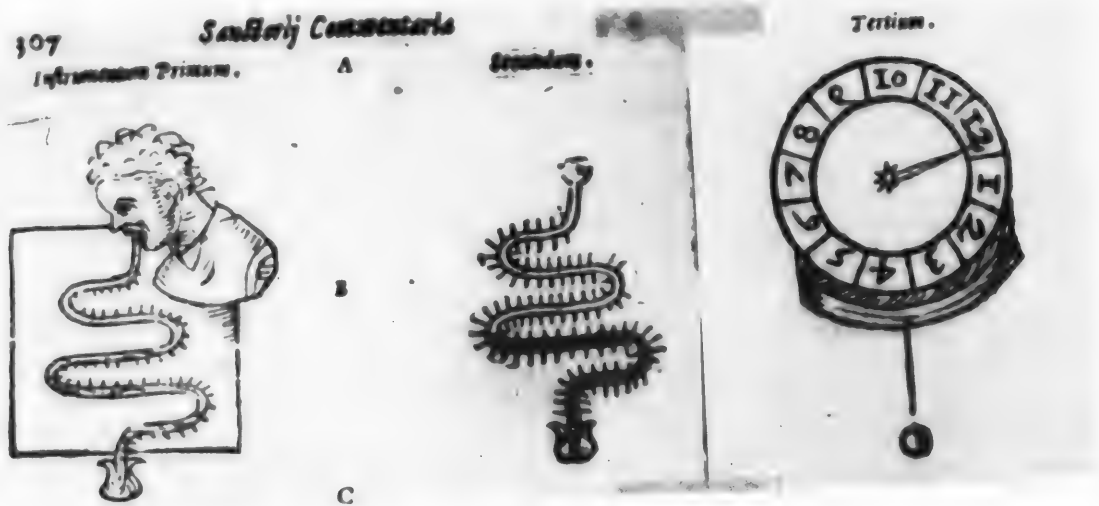


Fig. 2.

The thermometer of Sanctorius.

Right: Another form of pulsilogium with pendulum.

(Sanctorii *Commentaria*. Venice 1660)

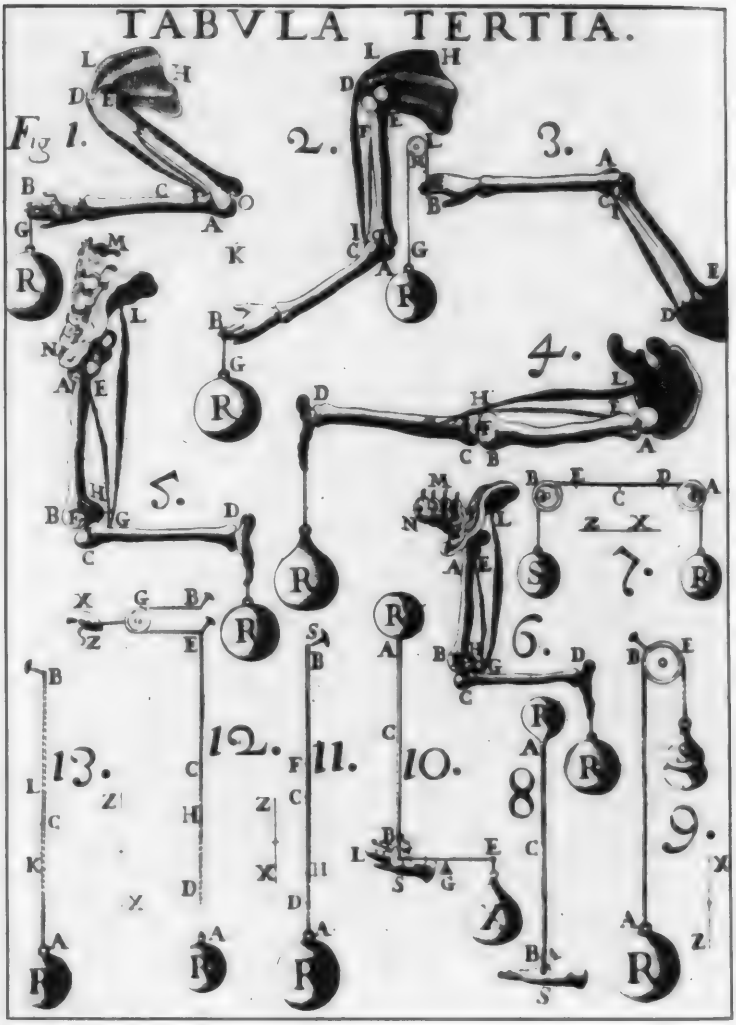


Fig. 3.

Experiments of Borelli on the motion of muscles.

(Borelli, *De motu animalium*, Rome 1680)

In 1656 he was invited to the chair of mathematics in the University of Pisa. In the same year Marcello Malpighi came from Bologna to Pisa and he became a great friend and a close collaborator of Borelli. Both devoted their attention to anatomy and physiology as much as to mathematics and physics. Borelli, Viviani, the true friend of Galileo, Torricelli, the pupil of Galileo who continued his physical studies and invented the barometer, and Francesco Redi, the poet and biologist, were the founders of the famous *Accademia del Cimento,* academy of the trial or of the experiment, which under the patronage of Leopoldo dei Medici was the center of experimental research. The name of the academy and much more the method of its work proved the spiritual inheritance of Galileo's teaching. Its motto was "*provando e riprovando*": trying and trying again; its work was dedicated to the further study and experimental proof of Galileo's doctrine. The Academy was in close contact with the Royal Society of London, and the acts of the Academy, translated in Latin and in English were called the Laboratory Manual for the following age. Not less important was the work accomplished by the famous *Accademia dei Lincei* (Academy of the Linx-eyed) founded at Rome in 1603 by Prince Cesi for which Galileo was the guiding spirit.

Borelli published first an important physical work, *De Vi Percussionis* on the power of percussion, and wrote a treatise on animal motion *De Motu Animalium.* It may be interesting to note that this subject was given by Galileo as the title of a book, planned by himself, in his letter to Cosimo II de Medici (1610). Borelli took Galileo's doctrine for his guide. He studied the function of the muscles according to mechanical principles and taught that when a weight is lifted the bone serves as a lever while the force exercised by the muscles acts as the shorter arm of the lever. He investigated the problem of muscular mechanics in exact manner calling in the aid of mathematical figures and calculations and drew a clear distinction between tonic contractions and voluntary contractions of the muscles. He was the first to affirm the doctrine of the neuro-genic origin of the heart beat, and realized that the contraction of the muscles and their swelling can not be purely mechanical, but must involve complex chemical processes. He affirmed that physiology has to be considered as a part of physics and to be enriched by mathematical demonstra-

tions. Borelli ranks, according to Nordenskjoeld, as one of the greatest pioneers of modern biology and the founder of the physiology of the muscles. The clinical teachers of the 17th century considered Borelli's book as a classic text and Boerhaave advised every student to read it.

But far beyond the limits of his school the influence of Galileo's teaching in medicine was a decisive and lasting one. Marcello Malpighi who spent a great part of his time in the laboratory and in the anatomical dissection room clearly appears to have followed in his research the guide of Borelli. He adopted the law, stated by Galileo, of the unity of nature, and laid first the foundation of the doctrine of the essential identity of vegetable and animal life. Through his microscopical investigation which brought him to the discovery of the capillaries, he completed the doctrine of the circulation. We may correctly think that from Harvey to Malpighi the influence of Galileo's doctrine on the discoveries of the laws of circulation was undeniable.

Francesco Redi was among the most active experimental investigators. His studies on insects brought him to a definite conclusion against spontaneous generation. He declared after long experiments carefully conducted that he never had seen a worm produced in vitro from putrefaction. After a series of trials, planned and executed in an original way, he concluded that nothing had ever been produced spontaneously in hermetically closed vessels.

The impact of Galileo's teaching on the development of experimental medicine did not lessen in later times. I may quote only the names of two great French physiologists of the 19th century: François Magendie, as a keen opponent of vitalism, affirmed the necessity of applying the method created by Galileo in medical studies—to observe and question nature by way of experiments; and Claude Bernard, the founder of modern physiology, wrote that according to Galileo it is impossible to define what life is, but it is necessary to analyze and to measure its manifestations.

* * *

Galileo spent the last years of his life in his villa at Arcetri, in the strict seclusion which was the prescribed condition of his comparative freedom. His last discovery of the moon's diurnal and monthly

digression was made in 1637, then he became blind. In his letter to Diodati he wrote: "Your friend and servant, Galileo, has been for the last month perfectly blind, so that this heaven, this earth, this universe, which I, by my marvellous discoveries and clear demonstrations have enlarged a hundred times beyond the belief of the wise men of by-gone days, henceforward is for me shrunk into such a small space as it is filled by my own bodily sensations. So it pleases God, so also shall it please me."

The dialogue on *Two New Sciences* which is considered as Galileo's greatest achievement was printed in Leyden in 1637, when its author was no longer able to read it. But the fire of his genius was not extinct. He continued until the last day of his life—January 8, 1642—working with a clear mind, with undiminished criticism, dictating to Viviani and Torricelli, his latest work on the theory of impact.

Galileo, a splendid example of the *homo universalis* of the Renaissance, was not only the great discoverer in astronomy, in physics, in mathematics and the founder of a philosophic system which had decisive influence on the evolution of philosophy from Spinoza to Gassendi, from Kant to Comte. He had a decisive influence upon the evolution of science and his work marked the crumbling of the structure of scholasticism and dogmatism. The assertion in his above-quoted letter, that his marvellous discoveries and clear demonstrations had enlarged the universe a hundred times beyond the belief of the wise men of by-gone days, appears today to be true. For the first time in history the unity of the cosmos and its laws were understood, asserted and proved, and the research in all fields of investigation had definitely found its new way.

GALILEO AND THE COMPOUND MICROSCOPE

RUSSELL L. HADEN

Spherical lenses were first combined to produce the telescope and compound microscope by spectacle makers in Middleburg, Holland. The discovery of the effect of this combination was probably the result of chance. There is no evidence that Zacharias Janssen who first made the compound microscope in 1590, or that Hans Lippershey who first made the telescope in 1608 had the knowledge of optics necessary to enable them to develop the instruments by reasoning from the principles of diffraction.[1]

Galileo, however, made a microscope and telescope through scientific reasoning. He deserves a prominent place in the early history of microscopy although his work with the microscope is overshadowed by his achievements with the telescope. The idea of combining lenses to increase magnification was not original with Galileo, but having heard that a combination of lenses had been used to make a telescope and microscope, he reasoned how this had been accomplished and soon constructed an instrument. The story is first told by Galileo in a letter to his brother-in-law, Landucci, dated August 29, 1609. Here he says: "You must know then that about two months ago (i. e., about June, 1609) a report was spread here that in Flanders a spy-glass had been presented to Prince Maurice, so ingeniously constructed that it made the most distant objects appear near, so that a man could be seen quite plainly at a distance of two miles. This result seemed to me so extraordinary that it set me thinking and as it appeared to me that it depended on the laws of perspective, I reflected on the manner of constructing it and was at length so entirely successful that I made a spy-glass which far surpasses the report of the Flanders one. . . ."[2]

Again in Sidereus Nuncius published in Venice in March 1610,

[1] See Singer, C.: Notes on the early history of microscopy, *Proc. Roy. Soc. Med.* (Sect. Hist. Med.), 7, part 2, p. 247-279, 1913-14; and Haden, R. L., The origin of the microscope, *Ann. Med. Hist.*, third series, Vol. 1, No. 1, p. 30-44, 1939.

[2] Fahie, J. J.: The scientific works of Galileo. Studies in the History and Method of Science. Vol. II, Oxford, 1921, p. 227.

he says: "About ten months ago a rumour reached me of an ocular instrument made by a certain Dutchman by means of which an object could be made to appear distinct and near to an eye that looked through it, although it was really far away. . . . And so I considered the desirability of investigating the method, and I reflected on the means by which I might come to the invention of a similar instrument. A little later, making use of the doctrine of refractions, I first prepared a leaden tube at the ends of which were placed two lenses each of them flat on one side, and as to the other side I fashioned one concave and the other convex. Then moving the eye to the concave one, I saw the objects fairly large and nearer, for they appeared three times nearer and nine times larger than when they were observed by the naked eye. Soon after I made another more exactly, representing objects more than sixty times larger. At length, sparing no labour and no expense, I got to the point that I could construct an excellent instrument so that things seen through it appeared almost a thousand times greater or more than thirty-fold nearer than if observed by the naked eye. How many and how great would be the advantage of this instrument by sea and by land it would be superfluous to enumerate. But leaving aside things terrestial I betook myself to the skies."[3]

Galileo showed also in Sidereus Nuncius a rough diagram to illustrate the path of the rays of light in a bilenticular system. The theory of refraction on which the microscope and telescope depend, however, was much more clearly expressed by Johannes Kepler in his *Dioptics* published in 1611. Here also Kepler first suggested the use of two biconcave lenses in place of the convex and concave lenses used by Galileo.

The telescope mentioned in Sidereus Nuncius and in the letter was a leaden tube 2.39 meters long and 42 millimeters in diameter. It was first shown publicly to the Senate according to Galileo on August 21, 1609 from the top of the campanile of San Marco. The campanile of the church of San Giustiona in Padua, 35 kilometers distant could be seen. The Senate in appreciation of the importance of the instru-

[3] Galileo, Sidereus Nuncius, Venice, 1610. The translation is from Singer in Notes on the Early History of Microscopy in *Proc. of the Roy. Soc. Med.* (Sect. Hist. Med.), 7, p. 247-279, 1913-14.

ment shown to them at once elected Galileo to a professorship in the University of Padua for life.[3]

It was evident that Galileo considered the microscope and telescope as essentially the same instrument which he first designated an occhiale. He mentions in Siderius Nuncius the use of this instrument either to see things distant or to magnify things near by. In 1614 Jean Tarde, the Frenchman, called on Galileo who he says "told me that the tube of a telescope for observing stars is no more than two feet in length, but to see objects well which are very near and which on account of their small size are hardly visible to the naked eye, the tube must be two or three times longer. He tells me that with this long tube he has seen flies which look as big as a lamb, are covered all over with hair and have very pointed nails by means of which they keep themselves up and walk on glass although hanging feet upward." [4]

Viviani, in his "Life of Galileo," says Galileo sent a microscope to the King of Poland in 1612.[5] There is, however, little evidence that Galileo had much to do with the microscope for a number of years after his initial experiments. He was primarily interested in the application of the telescope to astronomy. During this time he was a member of the Academy of Lynx founded in 1603 by Prince Cesi, who is probably properly designated the father of microscopy. Other members were Fabio Colonna, the botanist, Francisco Fontana, the astronomer who was also interested in the microscope, Gianbattista della Porta, who probably first suggested combining lenses to make the telescope and compound microscope, Francisco Stelluti, scholar and naturalist, and James Faber, a physician resident in Rome. Galileo must have heard numerous discussions concerning the microscope at the meetings of the Academy at the home of the Prince. Here a microscope was used to observe numerous microscopic objects. Cesi was especially interested in the spores of ferns and published microscopic observations made on them. Colonna published a book on botany in which the illustrations show that he must have utilized the microscope. Stelluti [6] tells how several members of the Academy had a part

[4] Fahie, J. J.: The scientific works of Galileo. Studies in the History and Method of Science. Vol. II, Oxford, 1921, p. 229.

[5] *Ibid.*, p. 230.

[6] Stelluti, F.: Persio tradotto, 1630, p. 47.

in studying the bee with a microscope, and preparing the plate showing the parts of the bee which appeared first in a broadside in 1628 and in Stelluti's book in 1630. Fontana made the drawing for the plate. It is difficult to believe that two men, as interested in the use of lenses as Galileo and Porta were, did not take part in the microscopic studies at the home of Cesi. There is no definite evidence, however, to verify this assumption.

A number of years later Galileo again became interested in the microscope. This is shown in the correspondence of Peiresc, a patron of science and a friend of many scientists, with his friend Aleandro in Rome. Peiresc in 1622 sent to Aleandro two Dutch microscopes to be presented to the Cardinal of Santa Susanna.[7] These microscopes were a long time arriving and when they were finally received no one knew how to use them. Aleandro writing to Peiresc from Rome, May 24, 1624 says: ". . . Galileo has been here these last few days and at once found how the occhiale was to be used but we don't think we see things very clearly . . . Galileo told me that he had discovered an occhiale which magnified these small things perhaps fifty thousand times so that a fly is as large as a hen." [8] On July 1, 1624 Peiresc acknowledged this letter saying: "As to the occhiale, I am pleased that Signor Galileo understood it, but I am sorry that you should not have had as a clear an effect as it gives in its proper adjustment if the object is to be lightened up by the rays of the sun. . . . But the occhiale mentioned by Signor Galileo which makes flies as large as hens is of the same invention as this one of which the author made a copy for the Archduke Albert of pious memory, which used to be placed on the ground when a fly was seen the size of a hen and the instrument was no higher than a dining room table." [9]

During this period of renewed interest in the microscope, Galileo's relation to the invention of the microscope was evidently questioned. In Il Saggiatore [10] published in 1623, he says: " Some would tell me

[7] Govi, G.: The compound microscope discovered by Galileo. *Jour. Roy. Mic. Soc.*, August, 1889, footnote 8, p. 590.

[8] *Ibid.*, p. 593.

[9] *Ibid.*, p. 594.

[10] Galileo, Il Saggiatore, Rome, 1623. The translation is from Singer in Notes on the Early History of Microscope in *Proc. Roy. Soc. Med.* (Sect. Hist. Med.), 7, p. 247-279, 1913-14.

that it is of no little help in the discovery and resolution of a problem to be first of all in some way aware of the true conclusion and certain of not being in search of the impossible, and that therefore the knowledge and the certainty that the microscope had indeed been invented had been of such help to me that perchance without that I should not have discovered it. To this reply that the help rendered me by the knowledge did indeed stimulate me to apply myself to the notion, and it may be that without this I should never have thought of it. Beyond this I do not believe knowledge to have facilitated the invention. But after all the solution of a problem, thought out and defined, is a work of some skill and we are not certain that the Dutchman, the first inventor of the telescope, was not a simple maker of ordinary lenses who, casually arranging glasses of various sorts, happened to look through the combination of a convex and a concave once placed at various distances from the eye and in this way observed the effect that followed thereon. But I, moved by knowledge given, discovered it by a process of reasoning."

About this time Galileo evidently made a number of microscopes and sent several to friends. On September 23, 1624 he wrote this letter to Prince Cesi: " I am sending your Excellency an occhialino by which to see close the smallest things . . . I have been long in sending it because I could not perfect it before having experienced some difficulty in finding the way of cutting glasses perfectly." He describes how the instrument should be used and says: " I have contemplated very many animals with infinite admiration amongst which the flea is the most horrible, the gnat and the moth are the most beautiful, and it was with great satisfaction that I have seen how flies and other little animals manage to walk sticking to the glass and even feet upwards." [11]

The first recorded scientific use of the microscope is in some observations made by Galileo in 1610. It seems evident that the instrument had been used earlier but for what purpose we do not know. John Woddenborn, a Scotchman who was a pupil of Galileo, wrote in 1610: " I heard a few days back Galileo himself narrate to the most excellent Signor Cremonius himself various things most desir-

[11] Govi, G.: The compound microscope discovered by Galileo. *Jour. Roy. Mic. Soc.*, August, 1889, p. 577.

able to be known and amongst others in what manner he perfectly distinguishes with this telescope the organs of motion and of the senses in the smaller animals; and especially in a certain insect which has each eye covered by a rather thick membrane which, however, perforated, with seven holes like the visor of a warrior allows it light. Here hast thou a new proof that the glass concentrating its rays of light enlarges the object; but mind what I am about to tell thee, viz., in the other animals of the same size and even smaller, some of which have nevertheless brighter eyes, these appear only double with their eyebrows and other adjacent parts." [12]

Summary

Galileo was not the first inventor of the microscope. He did make one independently by reasoning from his knowledge of optics as early as 1609. Singer's designation of Galileo as the effective discoverer of the microscope seems a proper and happy one. Galileo evidently realized the value of the microscope as a scientific instrument which had not been previously recognized. He made the first accurate observations with the microscope.

For a number of years, Galileo must have thought little about the microscope although during this time he was constantly working with the telescope. More than a decade after his original experiments, Galileo again became interested in the microscope, probably through an accidental contact with two microscopes sent to Rome by Peiresc. During this period he constructed microscopes, made observations with them, and sent instruments to his friends.

Numerous scientists were using microscopes by this time. The greatest center for study with the microscope was the Academy of Lynx in Rome of which Galileo was an active member.

[12] *Ibid.*, p. 575.

THE SCIENTIFIC PERSONALITY OF GALILEO

LEONARDO OLSCHKI

1. *Galileo in Our Time.*

In this crucial year of the struggle for the survival of Western civilization astronomers and physicists, technologists and physicians, philosophers and historians in all countries of a war-torn world join in an unanimous commemoration of the third century of Galileo's passing into eternity. There is no greater evidence of the universal importance of his achievements and of the spiritual solidarity which still determines the intellectual destiny of mankind.

Celebrations of this kind do not need to be the pretext for oratorical performances in order " to gild refined gold and paint the lily," as Shakespeare says. On the contrary, it is on these occasions that we can judge from a new angle and with our recent intellectual experiences the spiritual heritage of the men we are called upon to commemorate. In the case of Galileo two important trends in the spheres of science and learning suggest a reconsideration of his work and thought at this recurrence of his centennial. The so-called " classical mechanics " which he inaugurated with tenacious speculations and experimental tests represents today a mere border-line case of a physical cosmology based on the theory of quanta and on Einstein's extension of the Theory of Relativity. In the field of history a new appreciation of mediaeval science has diverted the interests of many scholars from the works of Galileo to those of the scientists and philosophers considered as his precursors and masters.

Consequently, while his physical theories have become partially obsolete and sometimes objectionable in the course of this century, the originality of his achievements in the different branches of science have been recently called in question or even simply denied. For instance, in the field of astronomy Galileo sometimes appears to be a fortunate, but not always successful, advocate of a cosmological system already discovered and explained by Copernicus and his predecessors. On the other hand, we are taught that his physical ideas had been anticipated by the Ockamists of the School of Paris who

introduced into Scholastic science a sort of quantitative interpretation of natural phenomena.[1] Recently the opinion has been expressed that Galileo " remained in method and philosophy, if not in physics, a typical Paduan Aristotelian." [2]

Furthermore there is a tendency now to minimize the importance of Galileo's contributions to experimental physics and to limit the interest of his scientific attainments within the field of an essentially abstract, speculative and theoretical science.[3] These changes in opinions and feelings which have come about in our time are eloquently illustrated by the startling fact that a philosopher and mathematician such as A. N. Whitehead—who certainly would not have tolerated the slightest limitation of his own freedom of thinking and speech—has transformed the humiliating punishment inflicted on Galileo by the Roman Inquisition into " an honorable detention and a mild reproof before dying peaceably in his bed." [4]

There would be little left for a celebration, indeed, if there were not a definite impression that all these facts and problems can be considered from a quite different angle. It is this striking conformity of an effacing criticism that arouses suspicion and suggests the question whether the more conditional appreciation of Galileo's achievements prevailing in our time depends on intellectual attitudes characteristic of our age or on objective conclusions drawn from verified facts.

It is not difficult to refute Whitehead's assertion. It was only by abjuring upon his knees his scientific faith that Galileo escaped death on the stake suffered by many victims of the same tribunal which condemned him to perpetual detention and prohibited his works.[5] Everyone can easily gather from his correspondence that his con-

[1] This trend is represented mainly by Pierre Duhem, *Les Origines de la Statique* (Paris, 1905), and *Études sur Léonard de Vinci* (Paris, 1906), later, but with less competence and criticism, by M. E. Strong, *Procedure and Metaphysics* (Berkeley, Cal.), 1936.

[2] John H. Randall, Jr., " *The Development of Scientific Method in the School of Padua* " in the *Journal of the History of Ideas*, Vol. I, 1940, p. 183.

[3] A. Koyré, *Étude Galiléennes* (Paris, 1939), p. 149 sq.

[4] A. N. Whitehead, *Science and the Modern World* (New York, 1926), p. 2.

[5] Cf. the Acts of the Process of Galileo in *Opere di G. G.*, Edizione Nazionale (Firenze, 1890-1909) (20 vols., reprinted in 1929), Vol. XIX, p. 279 sq.

temporaries had a quite different conception of honor and peace than that harbored by an outstanding philosopher of our own day, this while a little absent minded in judging the circumstances of Galileo's condemnation.[6]

As to the modern criticism of his accomplishments: it is the present preponderance of theoretical over experimental physics which contributes toward rendering prominent the abstract and speculative aspects of his scientific thought. In reality Galileo always put his extraordinary technical skill and his practical interests into the service of his physical conceptions. If Mersenne once claimed that no one of the experiments he tried to reproduce turned out to be correct and conclusive,[7] all the productive pupils and direct followers of Galileo—as Castelli, Torricelli, Viviani and the medical writers of his school—always asserted and proved the contrary. As a matter of fact, after his condemnation, only his physics of an experimental character could survive and prosper in the first scientific academies like the famous "Cimento," or in individual attempts to solve the problems of nature with the help of newly invented instruments of research: barometers, thermometers, microscopes, clocks and gadgets of different kinds. Thus to the historian of science who tries to have a comprehensive knowledge of the facts, experimental physics appears to be the primary and direct heritage of Galileo's scientific accomplishments.

The newly asserted connexion of his science, method and philosophy with the critical traditions of Parisian Scholasticism and Italian Aristotelianism, raises the suspicion that some intrinsic conformities might frustrate the understanding of the essential differences. These differences do not consist in problems which are eternal, but in their individual solutions. The vitality of these solutions is the only criterion of their validity. The assumption that these attainments ripened like hothouse plants in the seclusion of well-protected, scholarly institutions may correspond to a wide-spread historical determinism and may reflect a definite evolutionary trend in the interpretation of intellectual phenomena. In thus overrating

[6] Cf. the letters concerning Galileo's condemnation in Ediz. Nazion., Vol. XV, *passim* and the writer's book *Galilei und Seine Zeit* (Halle, 1927), p. 395 sq.

[7] Cf. A. Koyré, *op. cit.*, p. 147, n. 1.

the certainly important part played by the universities in the history of scientific discoveries no justice is done to the personal contributions of a creative spirit. It may be interesting and meritorious to investigate the philosophical and scientific currents within the Italian universities of the Renaissance, but it would be an error of historical perspective to emphasize their influence on the intellectual situation of that period or to connect the new trends of thought and life with the tradition and routine of the contemporary educational institutions.[8]

2. Galileo's Intellectual Attitude and the Official Culture.

In his intellectual attitude towards the fundamental problems of natural science and philosophy Galileo represents a new type of scholar and investigator, quite independent of the traditional methods of mediaeval learning and, even as a professor, always unconventional in his activity and behavior. Galileo's biographers show that his scientific personality developed not only outside of those institutions which were perpetuating the mediaeval methods of teaching, but also in a growing opposition to the official doctrines embodied in organizations of a strong conservative character under the watchful control of church and state authorities.[9] Even if the universities were for centuries the citadels of theology and of all philosophy connected with it, science is no exception to the general rule that all the great, daring and decisive intellectual and spiritual innovations characteristic of the culture and civilization of the Middle Ages, the Renaissance, and even of more recent epochs, had their origin and expansion outside of organized systems of learning of a scholastic or academic type. These centers have sometimes caught up, absorbed and directed the intellectual currents started by a creative genius or by collective experiences, but no inspired artist, no original poet, no religious

[8] The well known works of Lynn Thorndike (*A History of Magic and Experimental Science*, 6 vols., New York, 1923-1941) and of G. Sarton (*Introduction to the History of Science*, Carnegie Inst., 1927-1931) offer countless contributions to the knowledge of scientific trends in the European Universities of the Middle Ages and the Renaissance.

[9] Cf. E. Zilsel, "The Sociological Roots of Science" in the *American Journal of Sociology*, Vol. XLVII, 1942, pp. 544-562.

leader, no independent thinker, ever emerged from an official system of intellectual education. Spiritual independence and personal experience stimulated and inspired the imperishable achievements of St. Francis and Dante, Leonardo and Michelangelo, Petrarch and Columbus, of Erasmus, Descartes, Spinoza, Newton and Leibnitz, as well as the initiators of humanism and of the active and secular civilization of those times. Considered from this angle, most of the non-theological culture then fostered in European, and especially Italian, universities seems to have been developed far away from the creative centers of the contemporary civilization and to have accepted from the outside stronger influences than faculties and learned "magistri" were able to contribute to active life.

However varied the schools might have been, how differentiated the personalities of teachers and scholars may appear, they always represent the stationary trend of a culture conservative in methods and objectives. Within this rigid system of intellectual education natural philosophy had sometimes a privileged situation presided over by scholars who taught this discipline in a spirit of relative independence, especially in connection with their interpretation of standard works of medical writers. In these cases, rather rare indeed, philosophy could be considered as a matter of science and not as a question of faith. Cosmology as a theoretical foundation of astrology, and philosophy as a starting point for a science of nature were the principal requirements of the instruction of young physicians in all the European universities of that period.

Even if the philopsophy which was predominant in those institutions has subsequently lost its practical interest and its theoretical importance, this speculative foundation of professional instruction was justified by the fact, almost forgotten today, that no intellectual activity is possible outside of a definite spiritual system of thought and faith. The idea that this can ostensibly be dispensed with is a pure illusion deriving from the ignorance of the spiritual background of our intellectual activity. An attitude of such kind would have been inconceivable in Galileo's time.

Thus, while descriptive anatomy and empirical surgery required only the practical skill of the lower "mechanical arts," scientific medicine was considered in the official scheme of vocational education

to be a substantiation and application of natural philosophy as taught by the medical writers of antiquity and by their mediaeval and contemporary commentators. Evidently all the teachers of this branch of philosophy who dared to depart from the traditional and canonic maxims of Aristotelian science had regard for the growing influence of the extramural intellectual currents in which natural philosophy was taught in the spirit of Lucretius, Plato and of neoplatonic pantheism or with methods of a speculative empiricism inaugurated by some independent Italian philosophers of the Renaissance.[10]

The representatives of the official doctrines could not entirely ignore these vast intellectual movements aiming towards an emancipation of philosophical culture from Aristotelian traditions and the compulsory requirements of educational institutions. According to individual inclinations or to school traditions, Averroism or Humanism, presocratic philosophy and emanatistical doctrines, Augustine or Erasmus enlivened, differentiated and stimulated at different epochs the personal interpretations of the standard texts on which every branch of study was based for centuries in all the universities of Europe. But an intensive and fruitful expansion of every original effort to abandon the traditional track of thought and education and to transform the school drill into living thought was always hampered and destroyed both by the self-satisfied mediocrity of authoritative pedants and by the " sancta simplicitas " of suspicious monks. Thus William of Ockam was charged with heresy and then excommunicated; Petrus de Abano, the Paduan physician and magician, denounced to the Inquisition. Later on Agostino Nifo and Pomponazzi, both outstanding Paduan professors, were called to account by the same authority. The publication of Copernicus's book was subsidized by a cardinal, and the Pope accepted its dedication, but its suspension and condemnation was contrived by monks and professors who represented, in the orders and universities. the strongly conservative spirit of an official *docta ignorantia.*

Therefore the attitude of the school philosophers was persistently

[10] Cf. E. A. Burtt, *The Metaphysical Foundations of Modern Physical Science* (London, 1925), and P. O. Kristeller and John H. Randall, Jr., " The Study of the Philosophy of the Renaissance " in the *Journal of the History of Ideas,* Vol. II, 1941, especially p. 490 sq.

critical or compromising and never cooperative or encouraging to the trend of thought largely accepted, followed and discussed outside of their professional domain. It was in this spirit of antagonism and independence that laymen, scholars, aristocrats, literati and dilettanti promoted and attended those gatherings of cultivated people, called "academies," which flourished in the most lively centers of the Italian civilization of the Renaissance.

In comparison to these private attempts towards an independent philosophy the intellectual scope left to unconventional, if not original thinkers and scientists in universities was very narrow. The limits of their independence were both traditionally scholastic and personally self-imposed. The case of Cesare Cremonini, the most revered and most highly paid colleague of Galileo at the University of Padua, is very instructive in this direction and typical of an intellectual attitude oscillating between scholastic conservativism and individual talent, ecclesiastical tutelage and personal conscience. This famous scholar commented for decades on Aristotle in the Averroistic and Alexandrian spirit, typical of Paduan traditions of philosophy and somehow independent of the orthodox Thomistic interpretations.[11] Even as his outstanding predecessors in the same chair, he also had to defend himself for decades in an action instituted against him by the Roman Inquisition and from which he escaped by subtle subterfuges and by insistently declaring, like many of his precursors, that he taught "Secundum Aristotelem" but not "Secundum Veritatem."[12] On the other hand, when Galileo and his friends invited him to take a glance at the wonders of the sky just revealed by the telescope, he constantly refused to take advantage of this exciting experience, and after having made fun of the new invention he continued for twenty years more to teach Aristotle's physics, to explain the differences between the celestial and sublunar worlds, to discuss the role of the celestial intelligences in the spheres of the stars, to distinguish the "nature" of light and heavy bodies, firmly sticking in the fundamental proposition that "every motion is terminable."

[11] Cf. L. Mabilleau, *Étude Historique sur la Philosophie de la Renaissance en Italie*, etc. (Paris, 1881).

[12] Cf. the documents published by Mabilleau, *op. cit.*, especially p. 357 sq.

Squeezed between old heresies and new discoveries the natural philosophy of the Paduan school could only dissolve itself in a subtle, brilliant and unengaging dialectical playwork for the delight of ingenious spirits and as a training for intellectual refinement. But never could this way of thinking constitute the spiritual background of a scientific movement or create a new, frank and coherent scientific conscience.

3. *The "Double Truth" and the Physical Unity of the Universe.*

In the case of Cremonini and Galileo we do not need to compare the doctrines. The mental, moral and psychological attitudes of both men toward science and teaching are eloquent enough and convincing at first sight. Cremonini's philosophy is as compromising as his personality, and its conjectural and controversial character in perfect harmony with his fear of an experience which would engage his mind and influence his doctrines. The "double truth" always harbored by the Paduan masters in distress is a sanctuary for a bad scientific conscience but also a stimulus for intellectual ambiguities. This duplicity did not burden the adroit dialectician, because it was a matter of routine and a mental habit. It made no difference to him that he was wont to start his classes with a devout invocation of the Holy Trinity, the Virgin or the Saints, and then go over to demonstrate by logical deductions the mortality of the human soul and the unchristian consequences of the Averroistic doctrines. He covered those contradictions by the shocking device, "Intus ut libet, foris ut moris est," revealing thereby an attitude characteristic of many professors in epochs of political and spiritual oppression.[18] For the rest, Cremonini buried his conflicts under a tremendous amount of philosophical erudition that he himself and many of his admirers took for wisdom or intellectual experience.

Compared with him Galileo represents a quite different type of thinker and scientist. It is evident now that his celestial discoveries in the winter of 1609 and 1610 were not strokes of good fortune, as frequently described, but the result of a courageous determination.

[18] Cf. Mabilleau, *op. cit.*, p. 15, where Cremonini's maxim "inside it may be as one wishes, outside it must be as customary" is compared with a similar expression in Descartes's *Discours de la Méthode*.

He carefully constructed a telescope not only as an astronomical instrument, but also as a weapon in the fight for the truth. The telescope had not only to reveal the wonders of the sky and to give an empirical basis to the Copernican system, but it contributed towards eliminating an equivocal situation perpetuated by a kind of intellectual jugglery and of systematic self-deception. Besides the scientific deductions, Galileo drew from his discoveries a decisive personal consequence. He resigned his honorable and profitable appointment at the University of Padua and discontinued forever his activity as a professor. Cremonini shook his head and warned him that he would have to rue his decision to abandon a position comparatively safe and independent.[14]

Galileo's biographers advanced different hypotheses in order to explain that fatal step. The resignation was a simple and necessary act of honesty. After his discoveries it was impossible for him to reconcile his teaching assignments, bound to traditional conceptions, with his scientific convictions supported by indisputable facts. The epoch of a compromising, hypothetical and conjectural science and philosophy was over. A new type of scientist and a new scientific conscience arose from this new spiritual experience and situation which he was instrumental in precipitating. As long as the Copernican system had been a speculative vision resting upon mathematical calculations it was a private matter whether it was accepted or rejected. The telescope destroyed this alternative and made the revision of the scholastic cosmology unescapable. As soon as Galileo recognised that the celestial and the earthly matter were identical, and that the heavenly bodies are not moved by angels or divine intelligences but, as the earth, by general laws of motion, he immediately started his life-long struggle against the captious and objectionable expedient of double truth, and conceived the physical unity of the universe. This new and grand conception implied the conviction of the methodological unity of science. From that time physics, method and philosophy are for Galileo one and indivisible.

The basic principle of this new cosmological vision is that all physical aspects may be reduced to phenomena of motion which

[14] Cremonini's warning to Galileo is related in P. Gualdo's letter of July 29, 1611 in Ediz. Naz., Vol. XI, p. 165.

become consequently subject to measurements and thereby to mathematical demonstrations. Nothing of this kind had ever been conceived and formulated before Galileo. This comprehensive and fundamental doctrine is not and could not be the consequence of methodological discussions led in the classrooms of the Paduan University by the commentators of Aristotle's philosophy. It is the result of an original and daring intuition of a creative spirit provided with an uncommon power of scientific imagination. These conceptions are the most characteristic expressions of Galileo's scientific personality which had not been formed by a usual routine but by individual experience and an unconventional education.

He had always been an outsider in the academic world, just as every independent spirit is wont to be. The discovery of the periodic vibration of the pendulum was made when he was a student of medicine in Pisa and was not inspired by scholastic lectures and debates.[15] It can be considered as the first revelation of a scientific genius studying physical phenomena with penetrating sagacity and practical skill. As a young instructor at the same university he made fun of the pomposity displayed by his colleagues which disguised, under colorful caps and gowns, their stuffed brains as well as their empty pockets.[16] At Padua he taught privately in addition to his activity at the university and organized the first technical and experimental laboratory known in the history of science. At the end of his life he solemnly declared in the introduction to his *Dialogue Concerning Two New Sciences* that the arsenal of Venice offered him a vast field of meditation in which his philosophy took shape.[17]

[15] There is no reason to doubt Viviani's report of this first accomplishment described in his careful and honest biography of Galileo, Ediz. Naz., Vol. XIX, p. 601.

[16] Cf. the *Capitolo contro il portar la toga,* Ediz. Naz., Vol. IX, p. 213 sq. The little esteem in which Galileo held the Paduan professors of philosophy is mockingly expressed in the following anecdote told by him many years later: "At this point there comes into my mind the case of a teacher of philosophy at the University of Padua when I was there, who—as it sometimes happens—was angry with a rival and warned him that, if he would not change his attitude, he would secretly spy on his opinions taught in his classes and then sustain the contrary as a revenge." Cf. *Il Saggiatore,* etc., Ediz. Naz., Vol. VI, p. 228.

[17] *Discorsi e Dimostrazioni matematiche* etc., Ediz. Naz., Vol. VIII, p. 8.

In the course of his dramatic life Galileo found in universities his critics and enemies rather than his protectors and collaborators.[18]

4. *Problems of Science and Theories of Method.*

The new type of scientist and philosopher which Galileo represented could not fit into the intellectual and educational framework of the traditional school organisation. This fact is proved also by the circumstance that, contrary to the academic custom, he did not care about methodological speculations and doctrines, but derived his method from his own experiences and a philosophy of a quite personal character and aim. This philosophy *created* but did not *adopt* a method of thought and investigation. Galileo's physics, method and philosophy are interdependent and represent the inseparable aspects of his scientific thought. His quantitative approach to natural philosophy is inherent in his generalised conception of motion as an universal principle of nature. In fact all the changes produced in time and space by motion and the variations of velocity can only be tested by quantitative relations represented by numbers and geometrical figures. Astronomy is the oldest and most characteristic example of this type of science based on observations and mathematical calculations. Consequently a quantitative and mathematical method of investigation of the phenomena of motion has been compulsory whenever and wherever a scientific curiosity was directed toward them, first in antiquity, and later, sporadically, in the Middle Ages, since the time when Ockam and his disciples and followers objected to the integral applications of the Platonic and Aristotelian mechanical conceptions. But if the place is considered which the phenomena of motion take in the works, speculations and conclusions of these philosophers, then even the methodological differences existing between the ancient and the new systems of science appear in all their irreconcilable evidence.

In the philosophy of the Parisian Ockamists and of the Paduan

[18] The strongest criticism against Galileo's celestial discoveries came from J. Cesare Lagalla, Professor of Philosophy at the University of Rome, and G. A. Magini, Professor of Mathematics and Astronomy in Bologna, whereas the professors of the Collegium Romanum were held by Galileo as the mainly responsible instigators of his condemnation.

Aristotelians the problems of motion are one of the many debated in their works and lectures, as particular, if not accidental, or peripheric and secondary questions suggested by Aristotle's interpretation of natural phenomena. The quantitative and experimental solutions occasionally attempted or promoted in this field of natural philosophy were always partial, irresolute and erroneous, because even these scientists adhering to the critical tradition of scholastic Aristotelianism never departed from the fundamental maxims of Aristotle's and Plato's conceptions of motion.[19] They all tenaciously stuck to Aristotle's fatal error that a body continues in a natural state of *rest* as long as an impressed force does not compel it to change that state. The undiscussed acceptance of this static principle nullified up to the time of Galileo every impulse directed toward the clarification of the phenomena of motion and the generalisation of the quantitative method of physical investigation.

The case of Leonardo da Vinci is very characteristic in this regard if considered with a calm mind and a correct interpretation of his writings. Since he was an active and independent layman unspoiled by university education, he tried obstinately to solve in a quantitative and empirical way the mechanical problems handed down by scholarly tradition or inspired by technological routine. He was obsessed by the problems of motion which he tried to represent in impressive sketches and to formulate in eloquent aphorisms. But the scientific attempts of this great artist and engineer failed not only on account of the insufficiency of his mathematical talent but especially because he could not emancipate his mind from the traditional conceptions of motion as an accidental, contingent, and temporary phenomenon, never thinking of it as an universal principle of natural philosophy. Thus whilst the empiricists of the XVIth century, such as Tartaglia, and Benedetti, continued to study the phenomena of motion in themselves, so far as they appeared connected with the problems of ballistics and engineering, the contemporary professors of philosophy, as

[19] The independence of the physics of the *impetus*, partially accepted by the so-called Parisian school, on the Aristotelian theory of motion is more apparent than real, as it has been clearly proved by A. Koyré, *op. cit.*, pp. 28 sq., 40 sq., 93 sq. etc. The physics of the *impetus* is incompatible with the notion of *inertia* which is ubiquitous in Galileo's speculations about phenomena of motion.

Zabarella in Padua or Bonamico in Pisa still discussed questions of procedure and metaphysics arising from the exegetic or critical interpretation of the Aristotelian philosophical treatises and of the standard works on theoretical medicine.

The more intelligent and unprejudiced of these professors knew that the Aristotelian theories of motion were subject to criticism and correction. Cremonini's predecessor in the chair of philosophy, Giacomo Zabarella, introduced the section " de motu gravium et levium " of his extensive handbook on natural philosophy with the remark that there have been " big quarrels " about Aristotle's opinions on that matter.[20] He entered into the debate, again discussing procedures and the single aspects of the problems of motion. But as long as he held fast to the distinction of light bodies moved by a " natural " circular motion and of heavy bodies moved naturally " downwards in a straight line," no methodological clarification could effectively contribute to the solution of these problems or put the controversies on a new and fertile ground. All the theoretical debates about the causes of motion, all the discussions about the " quia," " propter quem," or " propter quid," and all the discriminations about " circa quem " and " ad quem " kept the science of motion in a dialectical circle as long as celestial matter continued to turn around in its immutable, ingenerable, and incorruptible sphere and the earthly matter to strive after its rest within its natural element. When Zabarella got rid of the intelligences for the explanation of celestial motion and inclined to a pantheistic interpretation of this metaphysical phenomenon, nothing was won for a natural philosophy based on quantitative and experimental principles.

Galileo, who liked jokes and jests, expressed in a merry anecdote the ridiculous behavior of the philosophers who think they can solve the problems of science by giving others the rules which they themselves are not able to practice. " I had a friend," says Galileo, " who wrote with a chalk on a canvas : ' Here, I want the spring with Diana and her nymphs; there, some greyhounds; in this corner, I want there to be a hunter with a stag's head; for the rest, country, woods, and hills.' Then he let the painter work out with colors the whole

[20] Cf. Jac. Zabarella, *De Rebus Naturalibus*, Ed. tertia (Coloniae, 1597), Lib. I, Cap. 1, col. 307.

scene and he was convinced that he himself had painted the case of Aktaeon after having only written the names on the canvass." [21]

Methodology without actual applications is like this and so are theories without experimental tests, programs and intentions without creative imagination. When Galileo discovered the isochronism of the pendular oscillations he had not yet heard a word about the "compositive and resolutive methods" so intensively discussed in schools, but he already must have had a presentiment of the procedure characteristic of his future mechanical investigations. His public experiments on bodies falling from the top of the Tower of Pisa may be legendary, but even in this case they are—like the telescope, like Descartes' famous *poële*, or Newton's falling apple—the popular symbol of an inspiration revealed by a stroke of genius and granting a new insight into the secrets of nature.

When Galileo started his first investigation on the problems of motion he was a young instructor at the University of Pisa. At that time he confessed frankly that he would follow the method he had learned from "his mathematicians," in open contrast to those philosophers, "who," as he says, "in teaching the elements of physics, proceed from what is handed down either in the books *De Anima* or in those *De Caelo* or of *Metaphysics*. . . . They draw their knowledge from things simply unknown or unheard of, but never from proved facts." [22]

This is not only a rejection of Aristotle but also an express challenge of his commentators and a decided criticism of their methods and procedures. It is a striking and characteristic circumstance that Galileo's first discussion of mechanical problems is still provisional and objectionable as to the scientific results, but already determined in method and philosophy. This is a point worth while to be considered both from a biographical and a general standpoint. His criticism of the traditional approach toward those problems implies his decision to discuss them outside of the Aristotelian framework of science and metaphysics. On the other hand, he declares never to draw his conclusions from propositions not entirely proved as facts or theorems. By that the young scientist cut off every con-

[21] *Dialogo dei Massimi Sistemi* etc., Ediz. Naz., Vol. VII, p. 436.
[22] Cf. *De Motu*, Ediz. Naz., Vol. I, p. 285.

nection with the methods of scientific speculation followed even by those of the university professors who took a critical attitude against Aristotle's doctrines.

5. *The Fundamental Principles of Galileo's Physics.*

As to the investigations themselves, Galileo reveals that his intellectual independence was not merely a theoretical one or the sort of wishful illusion cherished by so many of the contemporary philosophers, but already a ripening scientific conscience of an unmistakably personal character. In fact it is in his first fragmentary sketch of a new science that he deliberately abolished the notion of lightness or heaviness as qualities inherent in the bodies in conformity with their 'nature' and went on to consider their weight as a relative property explained by quantitative relations and consequently calculated by mathematical operations.

Thereby Galileo realised an old aspiration and put the problems of motion upon a new basis. His preliminary conclusions seem to be inspired by Archimedes' hydrostatics. But what gave him the power to understand and to generalise Archimedes was his independent grasp of essential phenomena and the keen idea of isolating them in their pure physical sphere.[23] The irrational explanation of fundamental human accomplishments as individual approaches or as strokes of genius may not satisfy the deterministic tendencies of evolutionary historians but there is no better way of doing justice to an outstanding personality or of understanding his intellectual traits. Galileo's scientific personality was already formed, if not entirely expanded, when he took over, in 1592, the chair of mathematics and astronomy at the University of Padua. He did not run the risk of becoming a typical Paduan Aristotelian by infusing into his physical methods of natural philosophy Zabarella's pantheistic corrections or Cremonini's Averroistic alterations of the official doctrine and texts. On the

[23] Archimedes has been entirely ignored in Mediaeval and Renaissance Universities, and he became accessible only in the advanced sixteenth century mainly through the efforts of Niccolò Tartaglia, an ingenuous mathematician and engineer. Cf. the writer's book *Galilei und seine Zeit*, pp. 76 sq., 147 sq. etc. The opinion of A. Koyré (*op. cit.*, p. 79) that Galileo's epistemology is not positivistic but Archimedian is only partially correct. Galileo's epistemology is—as we shall see—Galilean.

contrary, he became a Copernican by inclination the more he had to teach at Padua the Ptolemaic system, and he got rid of his last connections with Aristotelianism in spite of the fact that Cremonini's predominance increased within the university and the more the influence of the Jesuits grew in the European educational institutions.[24]

The speculations on problems of mechanics which kept him busy during the first decade of his stay at Padua, independently of his activity in the faculty and as a private teacher of technology, led—*inter alia*—to the first formulation of the velocity of falling bodies revealed in a famous letter to Paolo Sarpi.[25] In the same year, 1604, the appearance of a *nova* (the second in about half a century) again prompted astronomers and philosophers to reconsider the question of the celestial and the sublunar nature of the sidereal world.

Apart from the formulation of the long sought law of falling bodies which inaugurated classical mechanics and which represents its first irrevocable acquisition, these speculations reveal Galileo already in intuitive possession of the universal principles of a new science and philosophy. The first of these principles consists in his conviction that motion—and not rest—is the elementary universal condition of things in nature. This dynamic—or better kinematic—conception, which considers rest merely as a border-line case of motion, toppled over Aristotelian physics and transformed the whole of natural philosophy into a science of mathematically measured relations. In this intellectual revolution even the Archimedian models of physical investigation lose most of their stimulating and heuristic power and appear as individual cases of an essentially static conception of nature.

It is in this way that Galileo attained the fundamental conclusion that the vacuum is no impediment to motion, as taught by Aristotelian physics, but on the contrary a sort of ideal condition for the pure and direct understanding of the phenomena of motion. Thereby he created an imaginary reality as a pattern and standard for the actual pheno-

[24] Galileo's interest in Copernicus is already evident in his treatise *De Motu* written at Pisa before 1590 (Ediz. Naz., Vol. I, pp. 304 sq. and 326 sq.). For the further documents of Galileo's interest in Copernicus cf. *Galilei und seine Zeit, passim.*

[25] Cf. the fine analysis of this short letter in A. Koyré's *op. cit*, p. 78 sq.

mena in which an abstract and mathematical world finds its concrete realisation in spite of the resistance through medium and friction.

This conception is strictly connected with Galileo's idea of inertia which supposes, as everybody knows, that bodies abandoned to themselves persist in a state of rest or continue to move indefinitely and uniformly in a straight line. Although every attainment of his mechanical speculations presupposes this motion, Galileo never formulated it as an axiom or even as a principle of his dynamics, but expressed it only once in a marginal note of his *Dialogue on the Principal Systems of the World* merely as a summary of an important passage devoted to a general discussion of mechanical phenomena.[20] At that time Galileo was already in possession of all the principal propositions and conclusions of his new science. His failure to formulate *expressis verbis* and in a wording scientifically unobjectionable this basic principle has always been a riddle for those who have studied his works with historical sagacity and scientific acumen. As a matter of fact no one of his accomplishments in physics and astronomy would have been possible and could now be understandable without the precise knowledge of this fundamental principle. Evidently in Galileo's mind inertia was still an intuitive vision and not yet a simple physical notion.

It is erroneous to assume that the lack of a comprehensive formulation of the law of inertia in Galileo's works might depend on his still vague and fluctuating idea of its consistency or on his hesitation to fix it in definite terms. In reality he would not have been able to attain even one of his conclusions in astronomy and mechanics if the idea of inertia had not been already firmly rooted in his mind. In this initial stage of physical science its fundamental principles have still the character of visions created by an imaginative effort somehow related to artistic conception. But even in that form they are no less definite, clear and fruitful than an exact scientific formula. Galileo's physics and cosmology is not yet an intellectual system of impersonal propositions linked together by axioms and deductions, but an organic imagery of a cosmic extension based on a few principles of more intuitive than rational character. His science is an

[20] The passages concerning this subject matter are discussed by A. Koyré, *op. cit.*, III (*G. et la loi d'inertie*).

indefinitely extensive organism of coordinated knowledge whose fundamental statements follow from implications rather than from formulated propositions.

6. *Galileo's Cosmological Principles.*

Galileo expressly and repeatedly refused to discuss the infinite or even to speculate about it because he affirmed that this problem transcends the mental capacity of man. But he felt and accepted its existence not only as a natural correlation of his dynamic conceptions or as a pure mathematical speculation symbolised by numbers.[27] Galileo's *universo* is also *actually* infinite, even if beyond our understanding, whilst his *mondo*, i. e. the part of the universe accessible to our direct and concrete and intellectual experience, is *really* finite. Thus if an indefinitely extended uniform motion in a straight line is inconceivable and impossible in our orderly world, it may be imagined as a mathematical reality within the chaotic infinity of impenetrable space.[28] The world and the universe, always neatly differentiated by him, involve and determine each other in his cosmology which is much less explicit and enthusiastic than in Bruno's *Infinito universo e mondi*, but all the more consistent and convincing.

In fact Galileo did not merely shift into higher regions the heavenly spheres of the Ptolemaic and Thomistic systems but he eliminated them entirely, pulling down the supposed boundaries between the world and the universe. The infinity of the latter results from the assumption that it has no center and consequently no condition of above or below. Galileo did not draw metaphysical consequences from these implications but attained by the coordination of all these elements a coherent physical image of the universe confirmed, and at

[27] *Dialogo dei Massimi Sistemi* etc., Ediz. Naz., Vol. VII, p. 347 sq. and *Discorsi e dimostrazioni matematiche* etc., *ibid.*, Vol. VIII, p. 73 sq. The passages of Galileo's works concerning this problem are collected and commented upon in the dissertation of E. Wieser, *Galilei als Philosoph* (Basel, 1919), p. 12 sq.

[28] Galileo represented and illustrated this speculative fiction in a more literary than scientific way by referring to Plato's cosmogonic myth which imagines that God created the world by transforming the rectilinear movement of the heavenly bodies into a circular one. Cf. *Dialogo dei Massimi Sistemi* etc., Ediz. Naz., Vol. VII, p. 44 sq.

the same time inspired, by the empirical verification of the Copernican system.

Although scientifically incomplete and philosophically problematic the image is a perfect one because its solid intellectual structure and its immense spiritual extent are created and maintained by the intimate and necessary connection of all its constructive and derivative elements. They all involve each other so firmly that it is hard to say where Galileo's starting point might be found. Some of these constructive elements of his doctrine already appeared in more or less vague formulations, in presentiments and conceptions of antique and late mediaeval thinkers. But it would be erroneous to presume that the sum of those single notions could have produced the scientific image of the world conceived and worked out by Galileo. For the understanding of his achievements, the isolated details, the methodological considerations, and the scientific terms are less important than the state of mind, the comprehensive vision and the intense and penetrating effort of his constructive spirit. Inertia, relativity, infinity, motion, acceleration and the few other elements of Galileo's science are coordinated and indivisible aspects of one and the same idea arising from an integral dynamic conception of natural phenomena. The consistency of this theory results from the fact that each one of its principles necessarily involves all the others. The essential methodological consequence of this theory consists in the necessary application of mathematics in the analysis of natural phenomena and consequently in the exclusion of those problems which cannot be reduced to motion and measure. This is the origin of his imperishable accomplishments but also the source of his capital errors.

It is not correct to say that Galileo's explanation of the tides as a consequence of the double movement of the earth depended on his reluctance to admit occult natural actions.[29] In fact he praised enthusiastically Gilbert's theory of magnetism because he felt that, although it was inexplicable from his own standpoint, this phenomenon includes essential aspects able to reveal some enigmatical secrets of nature.[30] The impossibility of inserting Gilbert's observa-

[29] This theory is mainly discussed in the last of the four *Dialogues on the Principal Systems of the World.*

[30] *Ibid.*, Ediz. Naz., Vol. VII, p. 432 sq.

tions into his own mathematical system of motion prompted Galileo to let the matter rest, but not to reject the still occult effects of magnetism. He could do nothing with it except recognize its scientific importance. It is only in more recent times that its phenomena have become at least partially accessible to the dynamic and mathematical methods of investigation fruitlessly sought by Galileo. But it is evident that Newton's conception of a universal gravitation already recognised what Galileo dimly anticipated in praising the amazing theories of Gilbert and his opinions about the magnetic structure of the earth.

As to the tides the question is quite different. Galileo tried to submit the most powerful and regular phenomenon of motion on earth to the same physical laws which rule all the elementary dynamic phenomena of the universe. This mechanical explanation of the tides became a sort of crucial test for Galileo's scientific system and method and consequently the question on which the different opinions came into dramatic collision and finally to a fatal solution outside of the scientific field. But however tragic this event was for the persons involved and for its consequences in the whole intellectual life, it could not destroy the decisive achievements of Galileo's science and philosophy. The mathematical and experimental procedure in the investigation of natural phenomena was evident and cogent as a logical, and at the same time, natural consequence whenever Galileo's universal dynamic conception was accepted as a scientific maxim and a fundamental principle of nature. After his astronomical discoveries the uniformity of matter and of the constitution of the world seemed to have been established beyond any possibility of decent and clever doubt. Furthermore it seemed likewise proved that the same laws of motion ruled on earth and in heaven. The physical unity of the universe was established. This universe constituted of phenomena of motion can have only a geometrical structure accessible to the human mind through measurements and calculation. For that reason he liked to compare it to a book which is always open before our eyes but understandable only to those who are able to decipher its geometrical characters and to learn its mathematical language.[31]

[31] This idea has been repeatedly expressed by Galileo. Cf. mainly his *Saggiatore*,

As motion and mathematics are mutually inclusive, geometry is an essential aspect of nature, a sort of natural science more than an intellectual tool or a simple and constituent artifice of scientific investigation. In this form and intention Galileo's cosmic mathematics is quite different from the Platonic and entirely independent of the scholastic theories of motion. With his idea of the physical unity of the universe he went out to destroy all the basic dualistic conceptions openly or latently rooted in all the different systems and theories of natural philosophy handed down from antiquity, accepted by Christianity and conceived by some of the less conventional thinkers of the Renaissance, as for instance Telesio and Giordano Bruno.

7. *The Spiritual Unity of Science.*

It is from this standpoint and with this conviction that Galileo undertook his life-long crusade against every form and expression of double truth he found in metaphysics, philosophy, science, religion and ethics. This aspect of his thought and activity is the least known and appreciated parts of his scientific personality, but no less essential and original than his famous achievements in the different fields of science.

It is time now to consider the single manifestations of this intellectual struggle against the ambiguous and equivocal attitudes to be found in the official spheres of science, philosophy and education. It may be sufficient to recall to mind without superfluous discussions the sometimes daring but always original conclusions which Galileo drew from his fundamental conceptions of science and nature.

The most striking of these and the most distant from even the boldest doctrines ever taught in universities or individual philosophical systems is his assertion of the scientific unity of the pure geometrical forms with their actual and concrete realisation. In the *Dialogue on the Principal Systems of the World* the advocate of Galileo's opinions proves to the baffled and disconcerted representative of the official doctrines that matter and geometry are homogeneous and that e. g. the geometrical laws accepted for a mathematical sphere

Ediz. Naz., Vol. VI, p. 232 and the letter to F. Liceti of January 1641, *ibid.*, Vol. XVIII, p. 295.

or for other geometrical figures have the same validity if applied to the corresponding material objects.[32] These conclusions would have scandalised Aristotle and his followers at all times and they would have provoked the strongest reaction of all Platonists as well as the wrath of Bruno.[33] But Galileo's logical procedure is inexorable and his deductions cogent. They lead to the scientific justification and the intellectual foundation of the physical experiment as a substantiation of theoretical principles, and they abolish the discrepancy between mathematical abstractions and the reality of experienced facts. For Galileo truth never has a double face.

Consequently there can be only one way to the truth and one method for science. Galileo made this statement for the first time in the preparatory notes for his treatise on floating bodies, issued in 1612, scarcely a year after the completion of his first cycle of astronomical discoveries and publications.[34] This interesting fragment, which has never been inserted in his works, throws a bright light on his own conviction of the oneness of philosophical and scientific truth, and offers at the same time a curious reflection of opinions and habits predominating in schools and daily life, with special regard to the theory and practice of medicine. "At this point," Galileo says, "I expect a terrible rebuff from some of my adversaries; and I already hear them shouting into my ears that it is different to handle things physically or mathematically, and that geometers had better keep their playthings and not meddle with philosophical matters whose conclusions are different from the mathematical ones. As if truth could be more than one! As if it were impossible to be both geometer and philosopher and consequently that it could be concluded that he who knows geometry cannot know physics and cannot deal physically with physical matters! These conclusions are no less silly than that of a physician who, prompted by a bit of a grudge, said that the doctor Acquapendente, being a great anatomist and surgeon,

[32] Ediz. Naz., Vol. VII, p. 233 sq.

[33] In spite of his enthusiasm for Copernicus Bruno had a profound dislike of mathematics and hated furiously the mathematicians. For this attitude characteristic of humanistic philosophers cf. the writer's book on *Giordano Bruno* (Bari, 1927), especially p. 71 sq.

[34] Cf. the *Frammenti attinenti al Discorso delle Cose che stanno sull'Acqua*, Ediz. Naz., Vol. IV, p. 49 sq.

ought to content himself by keeping at his own irons and ointments without meddling with a physician's treatment; just as if the knowledge of surgery might nullify and hinder physical medicine! I answered him that I had several times recovered health from the great ability of Signor Acquapendente and could always and sincerely testify that His Excellency never gave me a drink composed of a diapalmae, caustics, twine, bandages, tents and razors; and he never made a cauterization or pulled a tooth for me instead of feeling my pulse; but as the very excellent physican he is he purged me with manna, cassia, rhubarb, and used other remedies fit for my ill health."

It must be left to historians of medicine to comment upon this sadly jocose monologue of the great scientist who sacrificed his health to his task and then became the victim of his physicians. For the rest this fragment is a curious and eloquent document of Galileo's attitude towards science, philosophy, life and his own profession. At first, it must be kept in mind that he wrote down these considerations when lively discussions were going on about the laws of floating bodies which he had already derived from the hydrodynamic application of the principle of momentum and of his fundamental physical methods and notions. He showed with these accomplishments in a new field of investigation and with similar preparatory reflections that the vast field of science shrinks up to a few common principles the more the intellectual horizons of the single scientist grow in extension and variety. He taught his ill-shocked and perplexed contemporaries not only the universal validity of his new science of motion but at the same time the dangers of a professional onesidedness within the purely intellectual as well as the practical field. The age old barriers between the liberal and the mechanical arts were overthrown by the simple consideration that there cannot be any contradiction of a theoretical, methodological and empirical kind within the sphere of one and the same science and profession.

For Galileo, Fabricius de Acquapendente was a great physician because he was an experienced anatomist and thereby fitly prepared for medicine as well as for surgery. He represents a new type of physician, just as Galileo embodies a new type of scientist who pulls down the traditional boundaries of academic and professional thought and embraces the endless variety of natural phenomena in a single

penetrating glance. The physician who complained against Acquapendente's supposed transgression of his professional competence was in the same intellectual position as Cremonini who published a book, *De Caelo*, in 1613, which intentionally ignored the new astronomical discoveries.

A similar attitude was taken by Galileo's opponents who charged him with having unduly attempted to introduce into natural philosophy a geometrical method of scientific investigation with destructive consequences for the doctrines taught in schools and kept by the majority of the learned and educated men. These opponents overlooked their own traditional habit of solving merely in a speculative and dialectical way the problems which could find their final solution "more geometrico" through a coherent method of physical and philosophical knowledge. The consistency of these conclusions is so incontestable that a philosophy based on logical deduction must surrender to a science of an absolute certitude. A double truth with different results is inadmissible. Galileo is convinced that even God cannot penetrate in a different way the few but fundamental conclusions attained by the human mind with the geometrical methods of thinking based on the elementary and universal conception of motion and measure.[35] Thus for Galileo the different interpretations of natural phenomena in science and theology are not only erroneous but also blasphemous. Thereby the consequences of his doctrines affected every branch of human knowledge and activity, from philosophy to theology, from technology to medicine, from mathematics to metaphysics. The physical unity of the universe has its counterpart in the spiritual unity of the human mind which is able to penetrate the secrets of nature with a superhuman power and a godlike certitude.

8. *The Tragic Epilogue.*

The great tragedy of Galileo's life was that he could not realize this highest aspiration of his free and bright spirit. As soon as he had ascertained the consistency of his scientific vision and could coordinate in a coherent doctrine his accomplishments in astronomy, mechanics, hydrodynamics, geometry and philosophy, the first con-

[35] *Dialogo dei Massimi Sistemi, etc.*, Ediz. Naz., Vol. VII, p. 128 sq.

demnation of the Copernican System, in February 1616, paralyzed the further evolution of his thought. He was pressed for the rest of his life into the same equivocal situation which he had toilsomelessly worked to eliminate for himself, science, and his followers and admirers. The double-dealing dialectics he had passionately opposed was forced upon him as the only way out of the alternative of either renouncing his scientific faith or incurring the penalty of a rebel. The dialogue form, so popular in his time, proved to be an acceptable expedient to represent the old and new philosophy of nature as equivalent, to the end of placing the decision on the mind of the reader.

Galileo's *Dialogue on the Principal Systems of the World* is not the work of a free and detached spirit, but is a literary artifice and an embarrassed make-shift which indirectly persuades the reader to accept and to generalize the principles and methods of his science and philosophy as represented in an illusory aspect of indifference and objectivity. The latent mendacity of double truth appears again in an attractive artistic camouflage behind which Galileo's cosmological vision becomes even more visible and convincing. But the artifice proved to be captious and threadbare. After the doctrinal condemnation of 1616 came the personal condemnation of 1632. There was no more possibility left for the defense of a sole and independent truth, with which every divine and human form of knowledge had to agree.

The consequences of his defeat are known, even if not completely recognised by all historians of science and culture. For a man loyal to the Church and his sovereign there was no escape possible other than the public and solemn abjuration which prevented the useless and infamous martyrdom of a death at the stake. Galileo saved his life and a part of his science. He knew that the section of his physical conception which he called a "new science" necessarily included all the other fundamental maxims of his philosophy of motion and consequently his cosmological doctrines. He sacrificed his scientific conscience for the purpose of saving his doctrines for the future of science and accepted the torment of reassuming in his seclusion the attitude of Cremonini which he so thoroughly despised:

intus ut libet, foris ut moris est. The popular rumor translated this sentence in Galileo's sense: *Eppur si muove!*

In the meantime Descartes suppressed his *Traité du Monde* which perhaps sketched the metaphysical unity of the universe on the grounds of the same forbidden doctrines. He spent the rest of his life in foreign countries, as a self-exiled gentleman who avoided the noise and perils of open controversies and realised his own device: *bene vixit qui bene latuit.*

The influence of Galileo extended over all branches of science, but no trace of his philosophy is to be found in his native country after his condemnation. Galileo's physics was deprived of its philosophical significance and of its metaphysical support, and thus science continued to live as a body without a soul and a game without a goal. Later on his philosophy found fertile soil in the pious, free and learned England of Milton, Newton and Hume in the spirit of the maxim which Galileo emphatically proclaimed and always fought for: "*Philosophy wants to be free.*" [1]

[1] *Discorso delle Cose, etc., ibid.*, Vol. IV, p. 65.

CHARLES SCARBOROUGH, AN ENGLISH EDUCATOR AND PHYSICIAN TO THREE KINGS

A Medical Retrospect into the Times of the Stuarts

BURTON CHANCE

William Harvey "in his will bequeathed 'to his loving friend, Mr. Doctor Scarborough' his 'velvet gown' as well as 'all his little silver instruments of surgery and desired him and Doctor Ent to look over those scattered remnants of his poor library and what books and papers they shall think fit to present to the College of Physicians."

It would be interesting to know something of the man for whom Harvey had such high regard—the man whose epitaph over the tomb in the little church at Cranford, not far from London, stated that he was "among doctors of the English, a Hippocrates; among mathematicos, a Euclid; blessed with a gracious manner, kindly affectioned to all and equable in every duty of life. Of citizens, husbands, fathers, friends, the best." More has been learned about him from his contemporaries than from any special records he had made of himself.

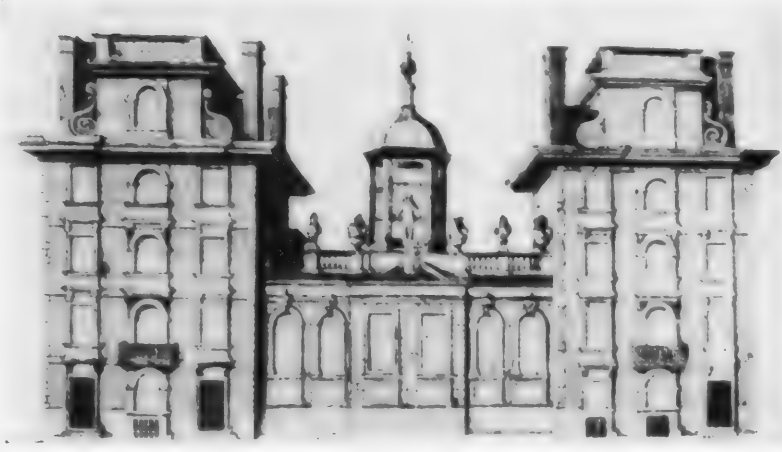
This incomparable person was born in London in the parish of St. Martin's-in-the-Fields, in 1616, and was educated in St. Paul's School, and Caius College, Cambridge.

Let us for a few moments consider the kind of education offered boys of Scarborough's age. St. Paul's was among the foremost schools of England. The original school was founded as a part of a monastery centuries before, but it had become 'decayed.' During the reign of Henry VIII, however, it was 'newly erected,' and, in the year 1509, endowed by Colet, dean of St. Paul's, "for one hundred and fifty-three children." It was burned down in the Great Fire of 1666, but was rebuilt by Christopher Wren a few years later. The accompanying picture shows that structure of 1674, regarded as an exact reproduction of the one destroyed in the Fire.

The Masters, selected with great care, were scholarly and in advance of the institutes of the day, in the fore-front of those who had imbibed the 'New Learning.' The Head Master, William Lilye, or Lily, a layman, born in 1468, while a student at Magdalen College, Oxford, began to study Greek. He had learned and later pursued

his studies among Greek refugees in Rome and on the island of Rhodes, after the fall of Constantinople. Lilye was the first to teach Greek in London, and was also the author of several books, especially a Latin Grammar which work, with unessential modifications ruled the schools of England even to the middle of the 19th Century! Furthermore, he was a friend of Sir Thomas More, and a poet of some importance in his day. He died of the plague in 1522.

The school was already famous by the time Scarborough entered,



possessing a valuable library. The discipline and teaching methods were severe and exacting; the scholars were led to take an intelligent interest in the learned literature available.

John Milton was a St. Paul's boy, and so was Pepys, the Diarist. Scarborough, about eight years of age when he entered, being "found apt," remained "till he had completed literature." By sixteen, being ready for the University, he was sent up to "Caius," Cambridge. Here he contined his studies in Greek and Latin, as well as mathematics, and, during his Fellowship, he received students and lectured on Oughtred's "Clavis Mathematicus," the first time that Book was read in the University. He translated Euclid into English, deserving the anathema of school boys ever since. William Oughtred (1557-

1660) it was who devised the multiplication sign, and similar abbreviations commonly used in trigonometry and other operations. One of Scarborough's great acquaintances at Cambridge was Seth Ward, noted Mathematician and Astronomer. In the meantime, Scarborough became attracted to Medicine and under the influence of his fellows at Caius, 'Caius' long the nurse of medical students, began to study it seriously.

The Civil War coming on, Scarborough espoused the Royal cause and promptly was ejected from his fellowship, "for conscience," and "spoiled of his library"; whereupon he migrated to Oxford having been attracted by the influence of Harvey's name, and entered Merton College where Harvey was Warden. Here a friendship that ended only with Harvey's death sprang up between them. About this time Harvey was engaged on his "Generatione Animalium" and Scarborough was able to assist him materially in it.

It is of interest to know when Scarborough began the serious study of Medicine. At Cambridge he was known as a Mathematician; and because of his loyalty to the monarchy and so long as the city was in the possession of the Parliamentarians, was admittedly out of favor, and there were no places for royalists at Oxford.

The Universities afforded little or no instruction in medical subjects, and, in neither city was there a hospital where aspiring students might obtain clinical courses. Singularly, at Oxford, it was not unusual for a student to receive the degree of "M. D.," at the beginning instead of at the end of his course. The granting of the degree might come either through the patronage of a powerful or royal friend whose privilege granted him that function. The applicant's theological studies might outweigh in importance his knowledge or skill in Medicine. The College of Physicians had the exclusive authority of licensing physicians in London and vicinity and none could legally practice without its license. At Oxford, in 1646, Scarborough was created a Doctor of Physic. In the letter from the Chancellor of the University he was described as a "Master of Arts of Cambridge of seven years' standing and upwards"; and, Dr. Harvey, in his letters-testimonial, wrote "he is well learned in Physics, Philosophy, and Mathematics." Shortly afterwards Scarborough went up to London, and, 1648 found him enrolled in the College of Physicians.

Harvey, after the surrender of Oxford, returned to London, and one of his first thoughts was to send for Charles Scarborough "in whose conversation he much delighted, and, whereas before he marched up and down with the Army, he took him to him and made him ly in his chamber and said to him: 'Prithee lay off thy gunning and stay here, I will bring thee into practice.'" And well he kept his word, for on the 8th of October, 1649, Dr. Scarborough was elected to the Company of Barber Surgeons, and before long was appointed reader of the Anatomical Lectures.

Wood, the historian of Oxford University, his fellow at Merton, relates that his friendship with Harvey continued unabated to the end of his patron's life; and, when on July 28, 1656, Harvey presented to the College of Physicians the title-deeds of his paternal estate in Kent and resigned his London lectureship, the office was transferred to Charles Scarborough. In his will, as we have already noted, Harvey made affectionate mention of his friend, so that literally, as well as metaphorically, Harvey's mantle fell upon Scarborough, who nobly sustained the charge, heavy as it was. Harvey's affection for Scarborough was aroused early, and in his old age he mastered Oughtred's 'Clavis' and, with his young friend, worked away at solving its mathematical problems. There is no doubt that throughout his life Harvey practiced every branch of the profession, and, since the spring of 1616, had lectured at the College of Physicians. He must indeed have been of great service to Scarborough in the preparation of the lectures which "he read with infinite applause in the Public Theatre of the Barber Surgeons Company, to the admiration of the learned men of the great city."

After helping Harvey with his "Animalium," Scarborough became a "most learned and incomparable Anatomist."

It is of interest to us to learn how Anatomy was taught in England in the 17th Century. Teaching was practically by a series of demonstrations on the human body, by a general survey rather than in detail. The right was vested in the corporate bodies like the Barber-Surgeons; private teaching was discouraged. Subjects for dissection were difficult to procure, commonly the bodies were those of executed criminals. By Act of Parliament the Masters of the Company were granted the right to take yearly the bodies of malefactors for their

BARBER SURGEON'S-HALL,
MONKWELL STREET.

Published Sep.r 29.th 1800 by John Manson, N.o 6 Pall Mall.

" further and better knowledge, instruction, insight, learning and experience in the science and faculty of Surgery." A single body was dissected to show the muscles, another to show the bones, another to show the parts within the head, chest and abdomen. Not always was the entire body demonstrated by a single lecturer. There were no means of preserving the bodies. Each course lasted three days providing twice a week a lecture in the morning and a lecture in the afternoon on Wednesdays and Fridays, on the art of surgery and how to dissect, the topics so arranged as to recur in cycles, year by year, extending to five or six years.

The ' Demonstrations,' called ' Public Anatomies,' usually took place four times a year. With the permission of the Company ' Private Anatomies ' might be held whenever a surgeon wished to dissect an interesting subject, and especially when a felon had been executed. The dissections were generally held in the Hall of the Company, the surgeon inviting his friends and pupils; while others attended as guests of the Company. The best teachers were sought after, whose appointment was for life. William Harvey, lecturing from 1615 until 1658, relinquished his place to Scarborough. The teachers were paid liberally, and two demonstrators were appointed to assist them. At first the cost of the lecturers and demonstrators was borne by the Company, but, after a time, benefactors came forward and, at their death, bequeathed funds for the purpose. The ' Lumleian Lecture ' was a surgery lecture founded in 1581, at a cost of £40 a year, by the efforts of Lord Lumley. The benefaction was proferred to the Barber Surgeons yet either was not acceptable or was not acted upon, but was later established at the College of Physicians.

The Anatomical Lecture was conducted with much ceremony and attended with great dignity and formality; the Lecturer counted as an individual of importance in the City. The Stewards and other assistants were given instruction in maintaining the strictest details. The Demonstrator had all the parts prepared, and the Master, as he read the description, pointed them out with his special wand, as they were shown to the spectators. These details were observed in the painting of the portrait of Scarborough and his demonstrator Edward Arris which hung for years in the Surgeons' Hall. When the Hall was destroyed the painting was removed to the Royal College of

Surgeons. (I have been informed privately that the painting has been removed to a place of safety).

After the morning lecture, The Doctor and the Company dined. After being plentifully regaled, they proceeded as before until the end of the third day. The courses were regarded as quite exhausting, and, after each lecture, unless some more substantial refreshment was provided, it was a further custom to present the audience with wine and spices. At the close of the lectures the Doctor was presented with the sum of ten pounds and the Masters and assistants given appropriate stipends.

The Demonstrators, for the three days succeeding the formal lecture, were allowed to read to their own pupils. The remains of the body were then decently interred at the expense of the Masters.

These methods were similar to the custom pertaining to the study of Anatomy throughout Europe.

In the records of the Company of Barbers and Surgeons on Monkwell Street, concerning the Anatomical and Surgical Lectures, it is noted:

8 Octo' 1649. This Court taking into consideration several worthy physicians of whom one might be elected reader of the Anatomical Lectures at the public dissections of this Co.: do think it fit that Dr. Scarborough be elected thereunto, who being desired to come to this Court appeared during the sitting thereof and declared himself willing to perform the same and rendered thanks to the Co. for their good opinion of him. Tuesday's lecture again revived. 18 Octo. 1649—Dr. Scarborough elected Anatomical reader.

Pepys, in his Diary, made several references to Dr. Scarborough on February 27, 1682-1683:

Pepys attended one of the Lectures and he gave a perfectly straightforward account of the proceedings. "Up and at my office— . . . About eleven o'clock Commissioner Bett and I walked to Chyrurgeon's Hall, we being all invited thither and promised to dine there . . . As the Anatomies were a public show. After dinner, Dr. Scarborough took some of his friends and I went with them, to see the body of a lusty fellow, a seaman, that was hanged for a robbery. I did touch the body with my bare hands; it felt cold, but methought it was a very unpleasant sight . . . Thence we went into a private room, where I perceive they prepare bodies, and there were the

kidneys, ureters, etc., upon which he read to-day, and Dr. Scarborough, upon my desire and the company's, did show very clearly the manner of the disease of the stone and the cutting, and all other questions that I could think of." Pepy's interest in this particular lectures lay in the fact that he had himself been cut for stone, a disease which seems to have been hereditary in his mother's family.

Thereafter, back at table, they discussed hanging, how "one Dillon, of a great family, was, after much endeavoring to have saved him, hanged with a silken halter of his own preparing, not for honour only, but it being soft and sleek, it do slip close and kills, that is, strangles presently; whereas a stiff one do not come so close together, and so the part may live the longer before killed. But all the Doctors at table conclude, that there is no pain at all in hanging, for that it do stop the circulation of the blood, and so stops all sense and motion in an instant."

Scarborough became the friend of all the well-known men of his day. In Evelyn's diary, under date of November 5, 1652, we catch a glimpse of him:

> Dr. Scarborough was instant with me to give the Tables of Veins and Arteries (which Evelyn had purchased in January 1645 of Leonænus in Padua—and other anatomical series which he had ordered made in April 1642) to the College of Physicians preliminary he would not only read upon them but celebrate my curiosity as being the first who caused them to be completed in that manner and with that cost but I was not so willing yet to part with them as to lend them to the College during their anatomical lectures; which I did accordingly.
> 1667—Oct. I made the Royal Society a present of the Tables which great curiosity I had caused to be made out of the natural human body.
> Received the thanks of the Royal Society and they are hanging in the Repository with an inscription.

It is of interest for us to note that Christopher Wren then only a lad of fifteen, once served among Scarborough's demonstrating assistants, and in later years acknowledged that he "had received many ideas and suggestions from that highly gifted man." It may be believed that young Wren learned from Scarborough his method of injecting the blood vessels as a means of transfusion which he demonstrated twenty years later.

Scarborough continued as the Company's lecturer for nineteen

years. He was succeeded as lecturer on the anatomy of the muscles by William Croone (1638-1684) a graduate of Cambridge in 1662. His practice was so lucrative that after his death his widow endowed, from his estate, the "Croonian Lecture" which lecture has been continued ever since.

"Scarborough was the first," Wood recorded, "that introduced geometrical and mechanical speculation into Anatomy, and applied them in all his learned conversation, as more particularly in his famous lectures upon the muscles of the human body for sixteen or seventeen years together in the public theatre at Surgeons' Hall, which were read by him with infinite applause and admiration of all sorts of learned men in the great city."

As a mark of regard for him the Company in 1649 (1651?) ordered his portrait to be painted by Greenbury and hung in the Hall. Pennant, in "London," published 1746, gives this account of it:

> He is dressed in the red gown, hood and cap of a doctor in physic, and is in the attitude of speaking; one hand on his breast, the other a little stretched out. On the left is another figure, the demonstrating surgeon, dressed in the livery-gown of the city of London; whose business it was to handle and show the parts of the dissected bodies. Accordingly, he holds up the arm of a dead body, placed on a table, partly covered with a sheet, with the sternum naked, and laid bare, and the pectoral muscles appearing.

Below the portrait was the following inscription:

> Haec tibi Scarburgi Arrisius queis spiritus intus
> Corporis humani nobile versat opus.
> Ille Opifex rerum tibi, rerum arcana reclusit,
> Et Numen verbis issuit inesse tuis.
> Ille dator rerum tibi res indulsit opimas,
> Atque animan indultes qui bene donat opes.
> Alter erit quisquis magna haec exempla sequetur,
> Alterutri vestrum nemo secundus erit.

Dr. Walton McDaniel, Librarian of the College of Physicians of Philadelphia, has kindly paraphrased the inscription for me:

> To you, Scarborough, Arris discloses these instruments
> Through which the inner mind examines the noble work of the human body.
> That Maker of things has revealed to you the secrets of Nature.
> And has decreed that authority reside in your words.
> That Giver of things has granted to you rich gifts,

And a mind which may well bestow the powers granted.
Quite different will be those who follow these great examples;
No one of you will be second to either.

In 1656, Scarborough ("being a doctor of physique, and of good

practice and knowledge") succeeded Harvey as Lumleian Lecturer. He attended Harvey in his last illness, in 1657, about which it was rumored that at the old man's request he had given him his quietus in a draught of opium. In 1658 he was deputed to greet, in a Latin

speech, the Marquis of Dorchester, on his admission to the Fellowship of the College of Physicians.

Scarborough was appointed physician to Charles II. It is likely that he was brought to the notice of Charles by Lord Berkeley, whose physician he probably was also, as, in May, 1660, he accompanied Berkeley in the distinguished company which went over to the Hague to escort Charles back to England and to his throne. Samuel Pepys was present also on that occasion. He has left us a lively account of the King's return from the War.

On the eve of the sailing, Scarborough dined with Pepys: "At supper the three Doctors of Physique again at my cabin; where I put Dr. Scarborough in mind of what I heard him say that children do, in every day's experience look several ways with both their eyes, till custom teaches them otherwise; and that we do now see with but one eye, our eyes looking in parallel lines." And so the decanter went around, and the company in the cabin discussed all manner of things, "coming in sight of land a little before night."

While Scarborough was active in the affairs of his College and held many official posts, he was never President. He has the distinction of being one of the original Fellows of the Royal Society, that "Invisible College" which encouraged the breaking down of old tradition, and afforded a new intellectual stimulus to men's minds so agitated by the events succeeding the Civil Wars.

In 1680, August 15, King Charles knighted him. His service to that King was not the only Court appointment he held. After Charles' death, he became personal physician to James II, and by him Physician to the Tower of London! Also to Prince George of Denmark; to King William III; and to Mary, his Queen. Not only was he attendant upon royalty, but was in wide request throughout the country.

Among his other pursuits, Scarborough was no mean naturalist, especially in Ornithology. A bibliophile of note, he possessed a valuable library of mathematical works and Greek classics which he intended to transfer to King William's Library at St. James' Palace. The project fell through, however, owing to the premature death of Queen Mary in 1694. The Library was disposed of piecemeal in 1698.

In the spring of 1682, Scarborough accompanied the Duke of York on a mission to Scotland, sailing on the "Duke of Gloucester." When in Yarmouth Roads, off the Humber, the "Gloucester" was wrecked, and, although the Duke was saved, many lives were lost. An account of this is given by Pepys who wrote 'though I had abundant invitation to have gone on board the "Duke," I chose rather for room's sake and accommodation to keep my yacht.' It was fortunate that his yacht reached the scene of the wreck before the great ship sank; they were in time 'to take up Sir Charles almost dead and others almost spent from the struggling in the water and cold.'

The wrecking of the "Gloucester" was due, in Pepys' opinion, to a pilot's "obstinate overwinning—in opposition to all contrary opinions of his master, mates, and the Duke, himself."

Scarborough was the King's chief physician in his final illness and subsequently wrote the lengthy Latin reports of his condition during those last days. The King died 6 February 1684/5. An autopsy was performed the next day, of which Scarborough, who headed the list of the distinguished group that witnessed or assisted at it, gave in Latin a report of the illness and of the examination of the body. The account was written probably at the request of King James, whose physician he then was also, to refute the rumor that the King had been poisoned. The only known English translation of that report is in the possession of the College of Physicians of Philadelphia, having been presented to the College by Dr. Krumbhaar in 1938.

From 1685 to 1687 Scarborough was a member of Parliament from Camelford, in Cornwall, but his parliamentary duties were not so exacting as to withdraw him from the pursuits of his profession. He had a country house at Cranford, twelve miles from London, to which he retired for rest after the busy life in St. Martin's-in-the-Fields. He did not retire from Practice until 1691. On Feb. 26, 1693, he "By no violent Distemper but by a gentle and Easy Decay Departed this life in the Seventy-ninth year of his age." He was buried in St. Dunstan's Church, Cranford in Middlesex. A white marble plaque on the north wall of the chancel bearing a Latin inscription, the English of which, in part, opens this brief account, and, to his "Pious Memory it was set up and Dedicated by the Lady Scarborough Relict to Sir Charles." The entableture is surmounted by two cherubs holding his coat of arms, "gules-three castles."

In the body of his late sacred Ma.ty of happy and blessed Memory open'd by his Chyrurgeons this day being the 7.th of February 1684. were observed these things following.

1. In the outward parts of y.e Brain the Vessels fuller of Blood then ordinarily they are found.
2. The Ventricles of the Brain full of Water; & in the whole substance of it a greater quantity of the like serous liquor then is usuall.
3. In the Breast the Lungs on the right side every where adhering to the Ribbs; the other side free as naturally it ought to be.
4. The substance of the Lungs perfectly sound but full of Blood
5. The Heart large & very firme as it ought to be.
6. In the lower Belly nothing amisse, only the Liver of a colour darker then ordinary, & full of Blood, as were also the Kidneys & Spleen.

Ch: Scarburgh. Tho: Witherley. Walt: Charleton E: Tickner
Ex: Barwick. Tho: Millington. Lod: Brady. Ferd:
Mendez. Wal: Needham. Ed: Browne. Th: Morton
M.d Lower. Ch: Fraiser. Edm: King. Jos: le Gevre
Christianus Harel. Martin Lister.
Ex Tile. Jo: Pearse. Grimk. Tho: Hobbs.

In my researches thus far I have not found any reference to Scarborough's actual attendance on the sick, or pronouncements on disease. The only works which survive this genial man of many parts include the "Syllabus Musculorum" which served as an anatomy text-book for many years; a treatise on Trigonometry; a compendium of Lily's Grammar; an elegy on Abraham Cowley. In my search for a copy of the Syllabus I was rewarded by a communi-

cation from Dr. John Fulton at the Historical Library, who has given me permission to photostat the title and some other pages, as well as to make an entire microfilm of the copy from his own collection which he had donated to the Yale Medical Library.

No definite volume seems to have been issued; what does appear consists of pages 103 to 119 of "Myotonia" a tiny work by William Molins, "Mr in Chyrurgery," London, 1680. Molins, a lecturer on Anatomy at Barber-Surgeons' Hall in the middle of the XVII Century, was one of a line in several generations distinguished in surgery. "Myotonia" gives a brief description of the muscles of the human

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Licenſed, *June* 17. 1676.

Roger L' Eſtrange.

MYOTOMIA;
OR THE
ANATOMICAL
Adminiſtration
Of all the
MUSCLES
Of an Humane
BODY,
As they ariſe in *Diſſection.*

As alſo an Analitical TABLE, reducing each Muſcle to its Uſe and Part.

Reviv'd with Additions,
By *WILLIAM MOLINS*
Mr. in Chyrurgery.

And Publiſh'd for the general good of all Practitioners in the ſaid *ART.*

Whereunto is added
Sir *CHARLES SCARBOROUGH's*
Syllabus Muſculorum.

London: Printed, and are to be Sold by *W. Rogers* at the *Sun* over-againſt St. *Dunſtan's* Church in *Fleet-ſtreet.* 1680.

[103]

SYLLABUS MUSCULORUM

Corporis Humani eo ordine diſpoſitus, quo à Carolo Scarburgio, *Med. D. & Anatomes Profeſſore Ordinario in uno, eodemq; cadavere adminiſtrari, & publicè exhiberi ſolebant in ejus de Muſculis Prælectionibus anniverſariis triduum habitis in Theatro Anatomico Chirurgorum* Londinenſium.

MUSCULI TRUNCI *& Capitis in Supino Corpore.*

Prælectio Prima

Matutina,

Muſculi Abdominis Compreſſores: Obliquus { Deſcendens / Aſcendens }; Rectus; Pyramidalis; Tranſverſus

[ ] + Muſ-

[102]

The great Toe is { Bended by *Flexor*. / Extended by *Tenſor*. / Obliquely moved by *Abductor*.

The firſt Joynts of the Toes are kept together by *Tranſverſalis Plantæ ſive Minor Adductor*.

The Skin { of the Sole of the Foot is moved by *Plantaris*. / of the Palm of the Hand by { *Palmaris Longus*. / *Caro Muſculoſa Quadrata ſive Palmaris Brevis*.

S. Y. L.

Muſculi { Teſtium { Cremaſteres
Scroti { Dartos

Prælectio Secunda
Pomeridiana.

Muſculi Faciei, tum anteriores Capitis.

Muſculi Superciliorum { Frontalis, *ſeu Erector*
Corrugator

Muſculi Palpebrarum { Orbicularis, *ſeu Clauſor*
Ciliaris
Elevator Palpebræ

Muſculi Oculorum { Obliquus { Major *cum Trochleâ.*
Minor
Elevator
Depreſſor
Adductor
Abductor } Oculi

Muſ.

Muſculi Naſi { Elevator
Dilatator
Conſtrictor } Alæ Naſi

Muſculi Labiorum { Elevator { Labri ſuperioris.
Depreſſor
Elevator { Labri inferioris.
Depreſſor
Zygomaticus. *ſeu Diſtortor oris.*
Sphincter Labiorum

Muſculi Genarum { Bucco, *ſeu Conſtrictor*
Quadratus

Muſculi Auriculæ { Elevator
Depreſſor
Adductor
Abductor } Auriculæ

Muſculi Membranæ Tympani Auris { Tenſor { Externus
Internus

Muſculi

body, together with tables specifying the location and actions of the part. Scarborough's " Syllabus " consists simply of a framework of captions of the muscular parts of the body to serve as headings for a lecture. The Lectures are arranged in a series of morning topics, and those for the afternoon, on three successive days. " Praelectio Sexta Pomeridiana," relates to " Musculi Totius Pedis." The cadaver is described as it lies—" Supino " or " Capitis in prono Corpore."

The tiny book ends with " An Alphabetical Table of the Names of the Muscles with the Page of each Muscle treated on " in Molins' division.

In 1705, Scarborough's son edited a posthumous English translation of Euclid's Elements.

Scarborough noted among his friends and associates, as already stated, many well-known men, besides Harvey and the great Diarist, he was intimate with the poets Waller and Cowley. Among his contemporaries were Francis Glisson, Robert Boyle, the chemist, Robert Hooke, Richard Lower, Sydenham, and Sir Thomas Browne, as well as John Locke. He liked to visit Hobbes and took great delight in conversing with him.

The medical man can find much to interest him in a contemplation of social matters affecting citizens of London during the reign of the Stuarts, and especially of the effects on the Restoration period of the newly discovered sciences.

Society during all these years was sharply divided into three distinct classes—the Court; the middle class composed chiefly of Puritans and Protectors; and, the miserable poor, whose poverty was rarely the subject for relief by either of the other classes. Quite naturally, Medicine was involved in the care of each class, but practitioners of the one sought no contacts with the others.

Before the Civil Wars, the physicians of London pursuing the Galenical traditions were a limited class, but through the results of explorations in distant countries, tending to correct the prevailing false notions of the world's geography and the inhabitants thereof, by the application of the facts of the New Learning their strength was renewed. Despite Harvey's account of the circulation of the blood, the classical school held on firmly. They supported their unopened minds by a formality of manner and in all subjects a show

of learning based upon assumptions not verified by the study of the human body and of nature. The creation of the College of Physicians by Linacre tended to perpetuate this state of things. "Fellows" were only Oxford or Cambridge men who had received at neither University any medical education or instruction.

Practice was in a chaotic state. In addition to the "regulars," fellows of the College, there were those who had become enthusiastic over the ideas set forth by Paracelsus which, after permeating the Continent had spread and infected the studious minded across the Channel, who, in turn, ceasing to 'exsanguinate their patients or drowning them in galenical potions,' made exorbitant claims for the virtues of mineral substances advocated by Paracelsus. Because of these excesses they became classed as 'Chemical physicians,' and promptly were ostracized by the College of Physicians, who denominated them as 'Quacks,' which word is an abbreviation of 'Quacksalver,' the English for 'Quicksilber,' the German for Mercury.

All previously accepted science was vitiated during the Civil Wars and the Commonwealth by a great upheaval of all thought, traditional opinion disregarded and unorthodoxy encouraged. Work on chemical subjects began to appear supporting the pretensions of the Quacks who throve at the expense of the regulars. Through the invention of appliance the increasing verification by laboratory study of those pretentions animated the growing scientific spirit, and the minds of serious physicians were so filled that they began to entertain great expectations that philosophers might, when the Restoration of the monarchy was accomplished, stabilize the prevailing unrest. Alas! this very growth of the scientific spirit encouraged by the creation of the Royal Society only aroused the distrust of all traditional usages. King Charles the Second, although the founder and patron of the Society, was himself a fomentor of the unrest. His insistence that only Fellows of the College of Physicians, Universities' men, should be the accredited physicians, kept many able and already distinguished practitioners in subordinate positions for years. Such exclusiveness tended to engender bigotry which, in turn, produced stagnation of the regular profession. By his encouragement of "Quackery" together with his sponsoring the College, it is not unnatural that the King's attitude quite forcefully, though perhaps

unwittingly, caused a lowering of the dignity of the profession. Moreover, all this, and the King's interest in unworthy and immoral persons did much to set the citizens against the regular profession. Astrologers abounded, cast horoscopes, and pretended to treat diseases by revelations emanating from the skies. In spite of laws enacted against them, quacks and empirics flourished. Moreover, regular doctors had their practice cut into by the surgeons and the apothecaries. Surgeons were not allowed to prescribe for internal maladies, and apothecaries were forbidden to do more than compound the prescriptions submitted to them by physicians, but they, in turn, did not hesitate to offer the prescriptions which, sent to them, they had no compunction to sell over and over again.

Physicians and surgeons were distinct both in practice and in position. The physician had no opportunity of learning surgery, and likewise, the physician had only an imperfect, if any knowledge of the science of the apothecary. In opposition to the licensed practitioner were the chemical quack, royal favorites, the prescribing apothecary, astrologers, base empirics, midwives and old women. Such a motley crew arose to compete with all honest endeavors put forth to heal the sick and to add to the sum of medical knowledge. The regular doctor whose learning was greater than his practical knowledge often veiled his ignorance by pedantic language and pompous manner. A notion of the doctors of that Century may be imagined from the caricatures and broadsides and books of that period. It was fortunate, and sad too, that while the young physicians were beginning to spend a short time in their probation period at one or other of the London Hospitals, older men, alas! unless they had studied abroad, had had no opportunity to attend hospitals.

My failure to find reference to Scarborough's course as a physician attending the sick is most disappointing. His time was the most favorable of all for exact clinical delineation of the known epidemics that visited London. He was at his prime when the "Great Plague" appeared, the last of that dread malady. Between 1625 and 1647 London was never free, and, in some years a large mortality was recorded, yet it is remarkable that for sixteen years prior to 1664, London was comparatively exempt. The plague was not, therefore, a new disease, like the cholera of modern times, but was almost a

constant and well-known domestic foe. Can it be that like Sydenham Scarborough fled the City taking his family to the country till the scourge had lessened or was over?

In the biographies obtainable I found no reference to a publication on the Plague by Scarborough, but Miss Brinton of the Yale Medical Library has informed me that she found in the Royal College of Physicians list the title "A Practical method as used for the cure of the plague in London in 1665, London 1722." On inquiry I was informed by Mr. Tubbs of the Royal College Library that he was unable to find any information concerning the reference as their salvaged books have been stored away and all records are unavailable.

It is important for us to note in the medical history of England that during the "Plague" there were also many cases of "Malignant" fever, such as what we now know to have been typhus fever, and that while the King and the Army were quartered at Oxford, in the year 1643, large numbers died of that infection also as well as from the plague.

The Great Plague of 1665 was exceedingly virulent in the west end of London, especially in St. Martin's and St. Giles' parishes; it was estimated that one-fifth of the population of London perished in that year. During the winter the disease was quiet, but by May it had begun to spread with alarming rapidity, and by September as many as 7,000 cases a week occurred. After it began to decline the rich people began to return and those who in June could leave their business. Pepys, on January 22, 1666, gives us a rambling yet pointed account, and asks whether all physicians had fled the country? Where could Scarborough have gone? We may grant that most of his patients must have left the City and that he should care for his family. So marked was the line which separated and confined the physician of the rich from him whose patients were the poor. The disease affected the lower classes more than the wealthy—so that it has often been called the "poor man's plague." It is recorded that the medical attendants on the poor remained, to their honor, and so did the surgeons and the apothecaries, and of their service we do have records. It was not at all unlikely that Scarborough had no plague patients. Regular or College physicians practiced only among the wealthy.

Again, I would ask, where was Scarborough in all these trying months? Certainly he must have felt it was his duty to remain to help sufferers who stood in so great need of medical help. Yet, it was only too true that had the West End physicians remained they would have found themselves almost in solitude among empty houses. It may be believed that the regular patients of the physicians even though they remained in town were but little affected. It is likely, therefore, that Scarborough saw very little of the disease.

As to his attendance on the Kings, contemporary diarists have left more extensive accounts of their illnesses, for obvious reasons, than have their attending physicians. To-day one must rely largely on such gossipy accounts from which one may surmise what were the sufferings of royalty.

To the end of his days Charles the Second must have required a physician's services frequently, because he lived a hard life from his youth up. His habits were sufficient to generate what was called "gout." The privations when he was in hiding and living in disguise, and the licentiousness of his course after his restoration, must have drained his system of all its strength. He admitted the paternity of fifty-three illegitimate children. In 1678 he had convulsions which presumably were dependent upon the virulent ague so prevalent at that period in England. His symptoms at the end were such as we are justified in believing to have been chronic nephritis, and uremia finally carried him off at the early age of 54 years.

While Duke of York, James became greatly attached to Scarborough and, as we have already learned, Scarborough accompanied him on his travels.

When King, and during his exile, James was an exemplary husband and father. In his early manhood he became infected with syphilis received from his mistress Anne, afterwards Countess of Southesk. Numerous births were ascribed to him, both before and after marriage, but few survived birth or early infancy. His was a highly emotional nature and, when under strain, especially when visiting Salisbury, in 1688, he was seized with violent epistaxis, he feared death was imminent.

James was deeply attached to Mary of Modena, born in 1658. She accompanied him in his exile in France, but suffered many years from

D.r Scarborough

To Dr. Scarbourgh.

1.

HOW long, alas! has our mad *Nation* been
Of *Epidemick War* the *Tragick Scene*,
When *Slaughter* all the while
Seem'd like its *Sea*, *embracing* round the *Isle*,
With *Tempeſt*, and *red waves*, *Noiſe*, and *Affright?*
Albion no more, nor to be nam'ed from *white!*
What *Province*, or what *City* did it ſpare?
It, like a *Plague*, infected all the *Air*.
Sure the unpeopled *Land*
Would now untill'd, deſert and naked ſtand,
Had *Gods* All-mighty hand
At the ſame time let looſe *Diſeaſes* rage
Their *Civil Wars* in *Man* to wage.
But *Thou* by *Heaven* wert ſent
This *Deſolation* to prevent,
A *Medicine* and a *Counter-poyſon* to the *Age*,
Scarce could the *Sword* diſpatch more to the *Grave*,
Than *Thou* didſt *ſave*;
By wondrous *Art*, and by ſucceſsful *care*
The *Ruines* of a *Civil War* thou doſt *alone repair*.

2.

1 The *Inundations* of all *Liquid pain*,
And *Deluge Dropſie* thou do'eſt *drain*.
Feavers ſo hot, that one would ſay
Thou mightſt as ſoon *Hell-Fires* allay
(The *Damn'd* ſcarce more *incurable* than *They*)
2 Thou doſt ſo *temper*, that we find
Like *Gold* the *Body* but *refin'd*;
No *unhealthful droſs* behind.
The ſubtle *Ague*, that for *ſureneſs* ſake
Takes its own times th' *aſſault* to make,
And at each *battery* the whole *Fort* does ſhake,
When thy ſtrong *Guards*, and *works* it ſpies,
Trembles for it *ſelf*, and *flies*.
The cruel *Stone* that reſtleſs pain
That's ſometimes *roll'd away* in vain,
3 But ſtill, like *Siſyphus his ſtone*, returns again,
Thou *break'ſt* and *melteſt* by learn'd *Juyces* force,
(A greater work, though ſhort the way appear,
4 Than *Hannibals* by *Vinegar*)
Oppreſſed *Natures* neceſſary courſe
It ſtops in vain, like *Moſes*, Thou
Strik'ſt but the *Rock*, and ſtraight the *Waters* freely flow.

3.

The *Indian Son* of *Luſt*, (that foul *Diſeaſe*
Which did on this his *new found World*, but lately ſeiſe;
Yet ſince a *Tyranny* has planted here,
As wide and cruel as the *Spaniard* there)
Is ſo quite rooted out by Thee,
That thy *Patients* ſeem to be
Reſtor'd not to health only, but *Virginitie*.
The *Plague* it ſelf, that proud *Imperial* Ill,
Which deſtroys *Towns*, and does whole *Armies* kill,
If thou but ſuccour the *beſieged Heart*,
Calls all its *poyſons* forth, and does depart,
As if it fear'd no leſs thy *Art*,
Than *Aarons Incenſe*, or than *Phineas dart*.
What need there here repeated be by me
The vaſt and barbarous *Lexicon*
Of mans *Infirmitie*?
At thy ſtrong charms it muſt be gon
Though a *Diſeaſe*, as well as *Devil*, were called *Legion*.

4.

From creeping *Moſs* to ſoaring *Cedar* thou
Doſt all the powers and ſeveral *Portions* know,
Which *Father-Sun*, and *Mother-Earth* below
On their green *Infants* here beſtow.
Can'ſt all thoſe *Magick Virtues* from them draw,
That keep *Diſeaſe*, and *Death* in aw.
Who whilſt thy wondrous skill in *Plants* they ſee,
Fear leſt the *Tree of Life* ſhould be found out by Thee.
And Thy well-travell'd knowledge too does give
No leſs account of th' *Empire Senſitive*,
Chiefly of *Man*, whoſe *Body* is
That active *Souls Metropolis*.
As the great Artiſt in his *Sphere* of *Glaſs*
Saw the whole *Scene* of Heavenly *Motions* paſs,
So thou know'ſt all ſo well that's done within,
As if ſome *living Cryſtal Man* thou'dſt ſeen.

5.

Nor does this *Science* make thy *Crown* alone,
But *whole Apollo* is thine own.
His gentler *Arts belov'ed* in vain by *Mee*,
Are *wedded* and *enjoy'd* by *Thee*.
Thou'rt by this noble Mixture free
From the *Phyſicians* frequent *Maladie*,
Fantaſtick Incivilitie.
There are who all their *Patients* chagrin have,
As if they *took* each morn worſe *potions* than they *gave*.
And

And this great race of *Learning* thou haſt run,
E're that of *Life* be half yet done.
Thou ſee'ſt thy ſelf ſtill freſh and ſtrong,
And like *t'enjoy* thy *Conqueſts* long.
2 The firſt fam'd *Aphoriſm* thy great *Maſter* ſpoke,
Did he live now he would revoke,
And better things of Man report,
For thou do'ſt make *Life long*, and *Art but ſhort*.

6.

Ah, learned *friend*, it grieves me, when I think
That *Thou* with all thy *Art* muſt dy
As certainly as *I*.
1 And all thy noble *Reparation* ſink
Into the ſure-wrought *Mine* of treacherous *Mortality*,
Like *Archimedes*, honourably in vain,
2 Thou holdſt out *Towns* that muſt at laſt be *ta'en*,
And *Thou* thy ſelf their great *Defender* ſlain.
Let's even *compound*, and for the *Preſent Live*,
'Tis all the *Ready Money Fate* can give;
Unbend ſometimes thy reſtleſs care,
And let thy *Friends* ſo happy be
T' enjoy at once their *Health* and *Thee*.
Some hours at leaſt to thine own pleaſures ſpare.
Since the whole *ſtock* may ſoon exhauſted be,
Beſtow't not all in *Charitie*.
Let *Nature*, and let *Art* do what they pleaſe,
When all's done, *Life is an incurable Diſeaſe*.

NOTES.

1.

1. *Gout*, and ſuch kind of *Diſeaſes* proceeding from *moiſture*, and affecting one or ſome parts of the Body, wherein the *Dropſie* ſwells the whole. *Inundation* ſignifies a leſs overflowing than *Deluge*.

2. *Find, Refind:* Theſe kind of Rhimes the *French* delight in, and call *Rich Rhimes*; but I do not allow of them in *Engliſh*, nor would uſe them at all in any other but this free kind of *Poetry*, and here too very ſparingly, hardly at all without a *third Rhime* to anſwer to both; as in the ninth ſtaff of the *Nemean Ode*, *Delight*, *Light*, *Affright*. In the third ſtaff to Mr. *Hobs*, *Ly*, *Fertility*, *Poverty*. They are very frequent in *Chaucer*, and our old *Poets*, but that is not good authority for us now. There can be no *Muſick* with only *one Note*.

3. The Fable of *Siſyphus* is ſo known, that it deſerves not to be repeated. He was in his life a moſt famous *Cozener* and *Robber*. Ovid. Metam. 13.

Quid ſanguine cretus
Siſyphe, fortis ac fraude ſatillimus olim?

For which he was ſlain by *Theſeus*, and condemned in Hell eternally to thruſt a great rolling ſtone up an Hill, which ſtill fell down again upon him, alluding perhaps to the ill ſucceſs of all his ſubtilties and wicked enterprizes, in which he laboured inceſſantly to no purpoſe.

Cancer of the Breast, dying in 1718. His daughter Mary, wife of William III, born in 1662, was never robust and succumbed to small pox in 1694.

William, the third, born in 1650, an unhealthy being all his days, asthmatical in boyhood, and dropsical later, refused to reside at Whitehall, fearing that it was an unsanitary place. He was a difficult patient to manage as he would not follow any physician's prescription, nor take advice as to change of habits. He probably was tubercular, which had affected the bones of his right arm, and without doubt he was afflicted by chronic pulmonary disease. It is well known that although a good horseman he died from the effects of injuries to his bones when thrown by his stumbling horse. He was a secret drinker, and, physically, altogether an unpleasant mortal, dying in 1712.

Anne must have been known to Scarborough for she was born in 1665. She relied on the advice of her favorites and on the charlatanry of the quacks who flourished in her days. Her symptoms were directed to her pelvic organs, which had been diagnosed as "Oöphoritis." She was too fond of alcohol and commonly was under its influence up to her death in 1714.

Anthony Wood consulted him on several occasions, and the poet Edmund Waller, who was afflicted with fatal dropsy, relied upon him. Cowley's association with Scarborough was more friendship than medically. Sir Charles had supported him when, for a somewhat political crime he was put in gaol, by obtaining his freedom and paying his debts. In gratitude Cowley, in one edition of his poems inserted a portrait of Scarborough, and published this 'Pindarique Ode' in praise of his Patron, which we may accept as the apotheosis of "Among doctors, an English Hippocrates."

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And, several private communications from friends in England have been of great help to me. Especially would I note the Rev. Maurice Child, Rector of St. Dunstan's Church, Cranford, who also sent photographs of the chancel where Scarborough was buried and of the entablature on the wall.

THE MYSTERY ABOUT THE FIRST ENGLISH (LONDON) PHARMACOPOEIA (1618)

GEORGE URDANG

There seems to be nothing so certain in this world of uncertainty as the law of numbers. "The first"—can this term mean anything else but the one single individual, fact, or event, appearing or happening prior to succeeding ones of the same or a similar kind? It was the peculiar privilege of those who were responsible for the issue of the first London Pharmacopoeia to have proven this apparent certainty to be a matter of discussion and arbitrariness. There are two "first" editions of this standard, the one which was issued under date of May 7th, 1618, and the other under date of December 7th of the same year.

The case in question is undoubtedly an unusual one. So far as the history of European pharmacopoeias is concerned it appears to be the only one. The anomaly is all the more striking since the Royal College of Physicians of London had this work in contemplation and preparation for many years. While the official continental European pharmacopoeias issued before 1618 were enforced only for the comparatively small territories of a city-republic, e. g. Florence, Rome, Venice, Nuremberg, Cologne and Augsburg, this guide was to become the standard, not only for the restricted London area, but for all of England. What is more, it had been looked forward to it by the representatives of medicine and pharmacy of Western Europe. Hence, when after years of delay, the book made its appearance in May of 1618, its withdrawal and replacement by another issue only seven months later must have caused no little embarrassment. One cannot go far wrong in assuming that the reasons for so unprecedented an action must have been serious indeed.

The first mention with reference to a planned London Pharmacopoeia is to be found in the Annals of the Royal College of Physicians of London for June 25th, 1585. The entry tells that "the compilation of a certain, public and uniform Pharmacopoeia to be adopted by all apothecaries in this country" had been discussed and that the matter had been left undecided in order to give the

members " a longer period of time to become acquainted with the problems in question." [1] It took the members of the Royal College of Physicians of London apparently much time to make up their minds. Another entry on the subject of a London Pharmacopoeia did not appear in the Annals of the College until four years later, viz. October 10th, 1589. However, now a rather definite step was taken. The entire materia medica was divided into ten groups and each of these groups was assigned to members of the College who apparently were considered especially familiar with the category of drugs concerned.

It is of the highest interest that one of these groups comprised " extracta, sales, chemica, metallica," thus definitely and courageously recognizing the new chemical therapy at a time where the fight of the representatives of official medicine against it was at its height. According to an entry in the Annals of the College for December 23rd of the same year " all colleagues, each one for himself, presented a paper about what they considered best for a new dispensatory to be published with the consent and for the use of the London College." This promising start, however, was not followed up by the necessary persistent effort. In December 1594, i. e. another five years later, the Annals of the Royal College of Physicians of London reported a change in the committee for " the examination of our dispensatory." Then for twenty years silence prevailed.

The reasons for the failure of the first attempt at an English Pharmacopoeia can only be guessed. The most plausible explanation seems to be that the progressive trend as expressed in the group " extracta, sales, chemica, metallica," had aroused sufficient opposition within the College to undermine the entire plan.

It was not until the 25th of June, 1614, that the plan of the preparation of a " common dispensatory to be kept in the apothecary shops " was mentioned again in the Annals of the College. From now on the development went on rapidly. On the 30th of September 1617 the President of the College, Dr. Atkins, told the Fellows that the Pharmacopoeia was " on the point of completion." [2] When

[1] William Munk, The Roll of the Royal College of Physicians of London, 1878, III, p. 371.

[2] William Munk, *l. c.*, III, p. 375.

then under date of May 7th, 1618 the long expected book appeared, the demand was apparently very urgent. The printer sold a part of the issue before the King's proclamation of April 26th, declaring the Pharmacopoeia obligatory for all of England, was officially delivered to him and could be included in the book. The only copy of the May issue hitherto discussed in the literature concerned, i. e., that preserved in the British Museum, is a representative of this part of the issue. It does not contain the King's proclamation. The page concerned is left blank and obviously reserved for it, while in another copy, acquired by the late Charles LaWall and now in the Library of the Philadelphia College of Pharmacy and Science, it bears the Royal manifesto.[3]

The sale must have gone on fairly well until the decision of the Royal College of Physicians of London to withdraw this issue put an end to it. The work was called in to be recast. "Within four months (namely on the 5th September following) arrangements were made for a new edition, which appeared on the 7th December 1618."[4] The Pharmacopoeia Londinensis of May 7th, 1618 was the first in fact, that of December 7th of the same year became the "first edition" by dictum.

There is one official explanation of these remarkable happenings in form of an epilogue to the second issue directed to the reader of the book. This epilogue, translated from the Latin original into English, reads as follows:

> We now edit the London Pharmacopoeia in a second endeavor, with more fortunate result. We (I say) edit. For that previous unformed as well as deformed book, may we say the hasty printer has edited it? On the contrary, he hurled it into the light. As a blaze flares up from a fire and in a greedy famine deprives the stomach of its still unprepared food, as the printer snatched away this little work not yet finished off from our hands, without consulting the President, yea even during a time when the latter who took care of corrections and polishing most thoroughly was out of town because of a call. After his return the President found with indignation the concoction which had crept into publicity defiled with so many faults and errors, incomplete and mutilated because of lost and cut off members. Having con-

[3] For the information about the copy owned by the Phil. Coll. Pharm. I am indebted to Dr. John N. McDonnell, Editor, Amer. Prof. Pharmacist.

[4] William Munk, *l. c.*, III, p. 375.

vened his colleagues in his home, the President has called in the whole work to be recast and has matured a new edition. Now this book finally appears purer as to faults and more complete as to remedies. Its future is to be the more fortunate if your confidence and benevolence will support it.

This epilogue forms the basis of all later explanations of the withdrawal of the first issue of the London Pharmacopoeia and its replacement by another to be found in literature. Munk writes that the issue of May 7th, 1618 was published "surreptitiously and prematurely, by the printer in the absence of the President."

C. J. S. Thompson and A. C. Wootton deal in addition in greater detail with this unfortunate printer.

Thompson makes the following statement:

The printer E. Griffin at the sign of the "White Lily" was therefore admonished and the publication taken out of his hands, it was reissued on December 7th of the same year with the errors corrected, by John Marriot at his shop in Fleet Street.[5]

A. C. Wootton writes: "This presumptuous printer was one John Marriott, at the inappropriate sign of the White Lily, in platea vulgo dicta Fleet Street."[6]

The statement of Wootton is definitely wrong, that of Thompson is misleading.

The title page of the first issue tells that Edward Griffin printed the book "sumptibus Joannis Marriot," i. e. at John Marriot's expense. The titlepage of the second issue does not mention the name of the printer but merely states "printed for John Marriot." Thus it is evident that John Marriot was the publisher of both issues. He turned the job of printing over to Edward Griffin whose printing shop enjoyed a good reputation[7] and it is by no means impossible that Griffin also printed the second issue though, because of the ominous epilogue anonymously.

The statements as to the punishment of the printer (publisher) of the first issue of the London Pharmacopoeia 1618 in the literature

[5] C. J. S. Thompson, The Mystery and Art of the Apothecary, Philadelphia, 1929, p. 142.

[6] A. C. Wootton, Chronicles of Pharmacy, London, 1910, II, p. 61.

[7] Henry R. Plomer, A Dictionary of the Booksellers and Printers who were at work in England, Scotland and Ireland from 1541 to 1667, London, 1907, p. 86.

having proved to be incorrect, it seemed the more questionable whether indeed the technical defects of the first issue were the real reason of its withdrawal. Even a very casual comparison of the two issues reveals differences of a very essential and by no means merely typographical nature.

It was in consequence of such a casual comparison that the author of an unsigned editorial in the well known English journal "The Chemist and Druggist" remarked: "It may well be that the prefaces to the two volumes . . . furnish another instance (than that officially given) of the proverbial antipathy between May and December." [8]

The translation of the prefaces to the two volumes from the Latin original into English proved that there were no substantial differences. Besides a few editorial changes the preface of the first issue was literally taken over into the second book, a procedure quite consistent with the evident intention of the epilogue not to admit fundamental changes to be in existence and to have been the reason for the second issue.

Hence the decisive question was whether there were such fundamental changes and if so, whether they, perhaps in connection with some facts of minor importance, could be regarded as the real reasons for the preparation of the second issue of the Pharmacopoeia Londinensis 1618.

It was at the instigation of my late friend Dr. Edward Kremers who had provided photostatic copies of both issues from the British Museum some years ago, and with the financial support of the Hollister Pharmaceutical Library Fund of the State Historical Society of Wisconsin, the only fund of this kind in the United States of America if not even in the whole world, that I carried through the investigation during the summer of 1940. The contents of both issues were thoroughly compared and the scientific and general background defined from which they originated. Finally the attempt was made to gather as much material as possible about the individuals who might be regarded as responsible for the preparation of the one or/and of the other issue. The publication of the results of this investigation is intended together with a reprint of the first issue of

[8] The Beginnings of Pharmacy, *The Chemist and Druggist* 106: 797, 1927.

the London Pharmacopoeia 1618. At this place I cannot give more than a short summary of my findings.

As pointed out before, the preface to the first issue is taken over into the second book without any substantial change. In this preface the authors state their intention to replace the "confusing abundance" of older formularies by a book that is "neither obviously lacking in medicaments nor crammed with them."

This intention has been fully realized in the first issue. Can that be said of the second issue also? In fact, it cannot. The second issue contains 963 formulae for "composita" instead of 712 of the first issue and lists 1190 "simplicia" instead of the 680 of its predecessor. Nevertheless, the mere fact of augmentation, though a deviation from the principles announced in the preface, could scarcely be regarded as a fundamental change. Furthermore the "epilogue" stated that the second issue was "more complete as to remedies." The question to be answered was whether this augmentation had an obvious effect on the character of the book. Such an effect could definitely be proved.

1. *The Simples.* In the first issue the list of simples had the heading "Catalogus Simplicium Quae Ad Pharmacopoeiae Hujus Compositiones Requiruntur" (Catalogue of Simples Required for Preparing the Compounded Drugs of *This* Pharmacopoeia). This heading was replaced in the second issue by the title "Catalogus Simplicium Ad Pharmacopoeiam Conducentium" (Catalogue of Simples Serviceable to *A* Pharmacopoeia). Accordingly the list of simples had been changed from an enumeration of those drugs called for in the preparation of compounded medicaments for which formulae and directions are given in the book, to a comprehensive survey of the entire materia medica of crude drugs in common use at that time. Thus having gained importance of its own, the list had of necessity to be taken from its modest place in the rear of the first issue and placed before the formula part in the second one.

b. In addition to the increase in the number of simples in the second issue, several new features were introduced, namely synonyms and permissible surrogates. From the number of such additions the intention becomes definitely obvious to supply an informative survey

instead of the catalogue of simples required to make the composita of the first issue.

2. *The Compounded medicaments.* a. Not only had the number of formulas been increased considerably in the second issue, but again and again the authors referred to further preparations "omitted intentionally," thus proving their intention of completeness as well as displaying their knowledge.

b. The part devoted to formulas was interspersed with explanations, suggestions, references and even definitions in the second issue none of which can be found in the first one.

c. An increase in the number of chemical preparations is further evidence of the general tendency toward completeness.

3. *Chapters of a General Character.* a. Extracts and vegetable salts. Although only a general method of preparation was given in both issues for extracts and vegetable salts, the number of examples was augmented in the second issue.

b. Interpretations of Generic Terms. In the first issue the interpretation of generic terms was restricted to those most commonly employed. In the second issue these interpretations were greatly extended and showed distinctly the intention to cover the entire field as completely as possible.

Summarizing can be stated:

The *first issue* of the Pharmacopoeia Londinensis of 1618 represents the type of unpretentious formulary designed exclusively to serve immediate practical purposes and to guarantee uniformity in the preparation of remedies generally recognized and in common use. In accordance with the principles laid down in the preface, it avoids superfluity.

The second issue represents the more pretentious pharmacopoeial combination of formulary and textbook, with the purpose of giving general information, also a survey of the entire materia medica, simplicia and composita. Contradicting the principles laid down in the preface, it is replete with that superfluity which the authors of the first issue had condemned as "the disease to be counteracted."

There can no longer be any reasonable doubt that the withdrawal

of the first issue was due to the victory of one principle over another, and not to technical deficiencies of the doomed book. The tale of the " presumptuous printer " who was blamed for the " surreptitious and premature " publication of the manuscript which had " not yet (been) finished off " may be added to the long list of similar pretexts so well known to history.

The victory of a different principle being a proven fact, the question has to be answered who the victors were, the men who prepared the London Pharmacopoeia of December 7th, 1618 or were at least responsible for it.

There are differences between the two issues which are of a definitely personal character. Among the many formulas of the first book to which author-names were added, were three with the names of three older members of the College of Physicians of London attached to their headings. In the second issue these names, as the only ones, were omitted. In the list of the members of the College included in the first issue to only four names had been added titles designating the respective persons as physicians associated with royalty in one official capacity or other. In the second issue five additional persons were thus distinguished. In addition, the seven members acting as electors were thus designated.

It is understood that it was the younger generation that was most opposed to every kind of discrimination which of necessity was to the advantage of the older members of the College. This group was naturally interested in a change. Such a change could be brought about only by the withdrawal of the first issue and its replacement by another.

Nevertheless, these personal grievances, as much as they may have mobilized the individuals concerned, would not have been effective without the existence of a general dissatisfaction with the character of the work of the older generation.

This assumption may find its confirmation and explanation in the change from the Renaissance to the Baroque spirit which was taking place at that time. Revived antique simplicity was giving way to abundance and even superfluity. Effective display, not immediate practical objective, dominated mind and action. Influenced by this new trend, the younger generation may well have been disappointed

by the simplicity of the first issue of the London Pharmacopoeia 1618. They certainly missed formulas which they were in the habit of using or prescribing. But they may have missed professional display even more. It is not impossible that they considered the absence of the display of knowledge as an affront to the dignity of the Royal College of Physicians, their illustrious society.

Naturally, neither of the two parties within the College wanted the differences between them, leading to the issue of the second book, to become obvious. That would have been detrimental to the authority of the College, hence to all of its members. It is in all probability for this reason that the second issue retained the preface of the first one unchanged, the fundamental changes in the second issue found no official mention whatsoever, and that finally the famous epilogue to the book of December 7th, 1618 represents so definite an attempt at letting the typographical errors etc. of the first issue appear the sole reason for its replacement by another.

As far as the sources available permitted, the mystery about the London Pharmacopoeia 1618, prevailing for more than three centuries, has been unveiled. However, the investigation has not been restricted to this point only. The attempt has been made to determine and to explain the medico-pharmaceutical situation around 1600 and the place of the first official English pharmaceutical standard within this situation.

Of the results of this part of the investigation only one may be mentioned at this place. Both issues list in the catalogue of simples a considerable number of animals, parts of animals, and excrements, in total 57 in the first book and 193 in the second. Wherever the London Pharmacopoeia 1618 has been commented upon since the middle of the eighteenth century (as stated before these comments were always devoted to the second issue), it was met with deprecatory criticism because of the abundance of nauseous drugs and especially of excrements listed.

In fact there is no reason for such an attitude. As the investigation showed, most of the animals, parts of animals and excrements concerned can be found already in Dioscorides' De Materia Medica and there is every evidence for the fact that this time honored compendium was used widely as a source by the authors of both issues of the

London Pharmacopoeia 1618. Of the urines, which by the way are listed in the second issue exclusively, not a single one has been prescribed as an ingredient of one of the compounded remedies of the book, be it internal or external.

Thus it becomes apparent that the criticism mentioned is a typical example of injustice based on the standards of a later period.

Both issues of the London Pharmacopoeia 1618, each in its way, are worthy of appreciation. Clearness of arrangement is their common merit. Although different in their structure and, to a certain extent, in their purpose, both rest on the same basis, that of progressive eclecticism. The second issue, finally, is with all its abundance and peculiar eloquence a charming representative of the rhetorical spirit that characterized the post Elizabethan period and which, with few exceptions, dominated European literature for at least a century.

I am glad and grateful that I was given the opportunity for this investigation at a time in which every manifestation of sympathy for, of solidarity with England has a special meaning. Among the products of work done in America and going now to England in ever increasing numbers, this one is certainly of the least practical value. However, I am sure that the English historians of pharmacy and medicine will understand the intrinsic value of this contribution to English pharmaceutico-medical history coming from America at just this time.

SIR CHARLES BELL AND THE BRIDGEWATER TREATISES

BENJAMIN SPECTOR

It seems to me that there are three reasons why the subject of this paper merits consideration. First, we properly take note of the death of Sir Charles Bell, an eminent anatomist, who died in Worcester, England on April 27th, 1842. He was a scientist who forged an enduring link in the chain of knowledge comparable, as has been frequently pointed out, to the work of William Harvey. Second, the Bridgewater Treatises, with which the name of Sir Charles Bell is indelibly associated, occupies an important place in the cumulative argument of design. Inasmuch as the causes of adaptations with which the Treatises concerned themselves are even now not adequately explained, it appears inevitable that the philosophical implications of the argument of design will come up from time to time as a vital issue, as indeed it has arisen in recent years. Third, our present political, social and economic plight shows us that the world is not quite sure whether Plato or Aristotle was right—whether man is Spirit or Machine. This controversy also occupied the mind of Sir Charles Bell. Philosophers, Historians, Theologians and Scientists continually return to a consideration of the argument of design albeit in the more inclusive and expansive sense of an Immanent controlling principle, as witness the writings of Tennant,[1] Haldane,[2] Whitehead,[3] Osborn,[4] Eddington,[5] Pupin,[6] Becker,[7] and Einstein.[8]

To come back to Charles Bell himself, the first consideration that I would bring to your notice is that if we would grasp the full significance of the man, we must regard him as the meeting point of two

[1] Tennant, F. R., Philosophical Theology, Vol. 2, p. 84, 1930.
[2] Haldane, J. S., Mechanism, Life and Personality, pp. 67, 125, 133, 1923.
[3] Whitehead, A. N., Adventure of Ideas, 1933, p. 251.
[4] Osborn, H. F., Evolution and Religion in Education, 1926, p. 62.
[5] Eddington, A. S., The Nature of the Physical World, p. 328, 330, 1928.
[6] Pupin, M., Has Science Discovered God? A symposium of Modern Scientific Opinion—Edward H. Cotton, Ed., 1931, p. 183.
[7] Becker, C. L., Progress and Power, pp. 78, 80, 101, 1935.
[8] Einstein, A., See reference under 6, p. 97, 101.

lines of intellectual endeavors; namely, his power in rendering intelligible the workings of the human body and his equally strong interest in the religious aspect of natural philosophy. Sir Charles Bell was born in 1774. He was the son of a clergyman. After informal preliminary studies he attended the University of Edinburgh for two years, and then began the study of anatomy as an apprentice to his brother, John Bell, a distinguished anatomist and surgeon. Already in these early days he exhibited strong mechanical and artistic abilities in the dissecting room and at the operating table, and at the age of 25 he became a fellow of the Royal Society in Edinburgh. Beginning with the year 1798 he published from time to time the results of his physiological and clinical studies. In the course of time he took over the direction of the Hunterian School of Medicine in Windmill Street, then a world center for medical education. Today, all medical students know of Sir Charles Bell under the Eponyms of Bell's Law of the Structural and Functional Discreteness of the Motor and Sensory nerves; the External Respiratory nerve of Bell; and the familiar lesion of the facial nerve known as Bell's Palsy.[9]

Let us recall that Charles Bell was born in the latter part of the Eighteenth century when things were relatively stable and tranquil. The mental outlook of this century may perhaps be best described by the word " Unhistorical." The times had a deistic flavor and the philosophy of hedonism prevailed.[10] It was the pre-Darwinian period emphasized so well by Bell himself in a passage in " The Hand " in which he says that " everything declares the Diversity of Species to have its origin in distinct creations . . . " " In fact, whatever science there was played a significant part in having Nature Divinized, for was it not science itself which everywhere revealed Order, Law and Design! " Then, too, the intellectual atmosphere was colored by the theological point of view of such natural philosophers as Locke, Grew, Ray and Linnaeus. That Bell came under the influence of some of these factors is evidenced in the following two letters. For instance, his natural piety is indicated under date of November

[9] *Medical Classics*, Vol. 1, 1936-37, p. 81, Ed. E. C. Kelly.

[10] Encyclopedia of Religion and Ethics. Ed. J. Hastings, Vol. XII, pp. 315-232, 1922.

[11] Charles Bell, The Hand, Its Mechanism and Vital Endowments, Envincing Design, Seventh Edition. Revised by Alexander Shaw, Lond., 1865, p. 113.

2, 1810,[12] in a letter he wrote to his future wife, Marion Shaw: "I see a God in everything, it is the *habit* of my mind. Do you think I could have been employed as I have been without contemplating the architect?" Again, he writes to his brother on December 5, 1818: "I love Nature and Nature's God with a sense of devotion—and I have never for a day let myself be lost in mere worldliness."[13] This reverential attitude is seen in many of his writings. There was as yet nothing in the latter part of the Eighteenth century to replace the prevailing Mechanical view of the Universe similar for example to the protest which the Baconian and Cartesian physics made against scholastic Aristotelianism. The advent of the theory of Evolution by Darwin was yet to come to the front.

A brief backward glance of the history of Natural Theology, to which Bell made his contribution in the book on "The Hand" will set the stage for our interpretation of that book. Natural Theology, in the time of Bell, was a conception which emphasized evidences of contrivances and design in nature ordered by an Intelligent Being for a Purpose. Our first effort, then, must be to remove ourselves from this conception of Natural Theology made so familiar to us by William Paley and the Bridgewater Treatises. We recall, for example, that Aristotle[14] in his De Caelo writes that God and Nature create nothing that has not its use and further that in his De Anima[15] declares that Nature does nothing in vain and omits nothing that is indispensable. The teleology of Galen's De Usu Partium has its roots in the books of Aristotle, just quoted. We also remember that Cicero in the De Natura Deorum[16] remarks "that man has been cared for by divine providence will be more readily understood if we survey the whole structure of man and all the conformation and perfection of human nature." Maimonides,[17] whose medical practice is based upon Galenic philosophy uses the same evidence. Francis

[12] Letters of Sir Charles Bell, Selected from His Correspondence with his Brother, George Joseph Bell, 1870, p. 180.

[13] *Ibid.*, p. 264.

[14] The Works of Aristotle—W. D. Ross, 1936, Vol. II. De Caelo, I, 4, 271a, 34-35.

[15] Aristotle, De Anima, R. D. Hicks, III, 9, 432b, 21. 1907.

[16] Cicero De Natura Deorum Academica, II, 54, sect. 133, Tr. H. Rackham, 1933.

[17] Sarton, G. Introduction to the History of Science, Vol. II, Part I, p. 74, 1931.

Bacon [18] in his book "On the Advancement of Learning" defines Natural Theology to be a knowledge, or rather a spark and rudiment of that knowledge, concerning God such as may be had by the light of Nature and the Contemplation of the Creature. We should also make note of one or two other authors who expounded Natural Theology. There is, for example, Sir Thomas Browne [19] who writes in vigorous language that "There are two books from whence I collect my Divinity besides that written one of God, another of his servant Nature, that universal and publick *Manuscript* that lies expans'd unto the eyes of all, those that never saw him in the one have discovered him in the other." In the 17th century John Ray and William Derham popularized the idea of making the book of nature a commentary on the book of revelation and in the 18th century and the early part of the 19th Natural Theology was cultivated with unparalleled zeal, coming to an end point in the Bridgewater Treatises. Before leaving this brief historical review, I wish to quote a passage from Spinoza since he is a striking example of one who did not share the opinions just outlined. Spinoza's answer to those who allege design is that their amazement at the structure of the human body is all due to their ignorance of the causes and because of this very ignorance conclude that the body was made not by mechanical but by divine or supernatural art.[20] We see then that the sort of thing which Bell does in the book on "The Hand" stretches back through the centuries and that the word "Design" is really not a blank cartridge as William James [21] would have it in his philosophy of Pragmatism.

We come now directly to a consideration of "The Hand, Its Mechanism and Vital Endowments, as Evincing Design." What sort of a book is it? Does it, as one author [22] has it, attempt to ransack the animal world to find arguments in comport with the desires of the reverend committee entrusted to carry out the aim of

[18] Francis Bacon, On the Advancement of Learning. Interpreted by Gilbert Wats, Lond., 1674, Lib. III, Chap. II.

[19] Sir Thomas Brown, Religio Medici, Boston, 1862, XVI, p. 32.

[20] H. A. Wolfson, The Philosophy of Spinoza, Vol. I, p. 435. 1934.

[21] William James, Pragmatism, 1907, p. 115.

[22] Miscellaneous Papers of Andrew Jackson Dowe, M. D. 1894, p. 262.

the Rev. Francis Henry Egerton, Eighth Earl of Bridgewater? That this point of view is incorrect and in fact, an injustice to Bell, I shall support by citing passages from the book itself. The earl died in the year 1829 and directed in his will that the sum of £ 8000 and accruing dividends be paid to those selected to write, print and publish one thousand copies of a work: "On the Power, Wisdom and Goodness of God as manifested in the Creation, illustrating such work by all reasonable arguments, as for instance the variety and formation of God's creatures in the animal, vegetable and mineral kingdoms, the effect of digestion and thereby of conversion, the construction of the hand of man and an infinite variety of other arguments, as also by discoveries ancient and modern in arts, sciences, and the whole extent of modern literature." [23] I repeat that it is necessary to keep in mind the fact that Bell was eminently pious and indeed had already five years before embodied in his treatise on Animal Mechanics (1827) a discussion of the concept of natural theology. Even more to the point is Bell's comment in his Preface to the book entitled "The Hand." These are his words: "The reflections contained in these pages have *not* been suggested by the occasion of the Bridgewater Treatises but arose long ago. An anatomical teacher, himself aware of the higher bearings of his science can hardly neglect the opportunity which the demonstrations before him afford of making an impression upon the minds of those young men who for the most part receive the elements of their professional education from him; and he is naturally led to indulge in such trains of reflection as will be found in this essay." [24] It appears from this passage that Bell looked upon the matter as a Duty to be performed. One may, indeed, go back twenty years before the publication of "The Hand" and find Bell in the year 1813 exposing the futility of the French philosophers and physiologists, for example St. Hilaire, who represent life as a mere physical result of certain combinations and actions of "elements." [25]

Another aspect to bear in mind is that Charles Bell took a larger view of design than is ordinarily understood by the Bridgewater

[23] Catholic Encyclopedia, 1907, vol. 2.
[24] "The Hand"—Preface.
[25] *Ibid.*,—Preface.

Treatises. A reference to the ipsissima verba of some of his letters will make clear his attitude. On December 15, 1815, he writes to his brother: " I, for my part, have no pleasure but in anatomy. You will say that it is that I may become the captain of anatomists; but why then have I such inexhaustible delight in the *whole face of nature?* No, it is in the pleasure I have in investigating *structure*. Everything there so *perfect*, so curiously *fitted* and leading you, little by little, to the comprehension of a Wisdom." [26] Again on March 2, 1818, he writes: " If I am to be anything, it is from connection with Natural Philosophy by Anatomy. I have resolved to address men of science (a group of engineers) on the uses of anatomy by which I shall show them how God Almighty makes arches and ropes." [27] It is not far afield to say that such thoughts impelled Bell to discover God by the laboratory method, and to say this is not to imply irreverence.

We may rightly ask the question as to why Bell found the human hand a favorable field for his intellectual powers. The answer again is to be gotten in his own words—" the hand represents the last and best proof in the order of creation of that principle of Adaptation which evinces Design.[28] Further, " there is extreme grandeur in the thought of anticipating or prospective Intelligence, nor are these conclusions too vast to be drawn from the examination of a part so small as the Human Hand." [29]

Bell's method of developing his thoughts is interesting. He has, for example, no fear of considering the body as a Machine only; on the other hand, he does not see the necessity for doing so. The important thing, in his opinion, is to handle the matter with a mind free from vicious bias. This attitude, we should agree, conforms to the high standards of good scientific thought and work. To support his thesis in " The Hand," Bell, the scientist, goes to the field of Comparative Anatomy to bring forth evidence of perfection of structure, and he uses this tool because of his respect for the genius and good sense of the distinguished naturalist, Cuvier. Bell devotes considerable space to discussions of the anatomy of the quadrumana—the sloth, bear, eagle, lizard, horse, elephant, deer, frog, snail, bat and even antediluvian fossils.

[26] " Letters "—p. 251.
[27] " Letters "—pp. 259, 260.
[28] " The Hand " p. 28.
[29] *Ibid.*, p. 270.

It seems surprising that an investigator, so meticulous in observation, so exact in experiment as Bell has shown himself, would allow his mind to become involved in speculative doctrines of the Aristotelian school. However, the surprise is measurably lessened when we observe that in the Introduction to "The Hand," Bell takes the position that in the mechanical construction of animals, as in their endowments of life, they are created *in relation to the whole*, planned together and fashioned by one MIND[30] and in addition that nothing is satisfactory until it is declared and believed that it has been the will of an Omnipotent Being to create.[31] Bell is sufficiently imbued with this idea to be disturbed at what he calls the perverse ingenuity of some distinguished naturalists who seek to obscure the conception of a Divine Author, an intelligent, designing and benevolent Being. And yet, the objectivity of Bell's scientific works indicates that he understood clearly that Science *must* fail if it attempts to grasp a totality.

Up to this point I have brought together evidence to support the opinion that Bell is distinctly a product of a combination of two strong impulses within himself—the scientific and the religious or devotional.

I wish now to direct your attention to one scientific contribution referred to by Bell in "The Hand" to show how he colors it by the underlying concept of Prospective Design,—that is, modifications in structure in preparation for but never consequent upon a new condition.[32] In his discussion of Sensibility and Touch, Sir Charles Bell makes the keen observation and develops the thought that in the matter of the sense of touch, we must not only feel the contact of the object but we must be sensible of the *muscular* effort made to reach or grasp it in the fingers. To this consciousness of muscular exertion he gives the name "muscular sense," calling it a sixth sense. His exact words are: "I was finally enabled to show, first by anatomy, and then by experiment, that the muscles are provided with two classes of nerves; that on exciting one of these, the muscle contracts; on exciting the other, no action takes place; and that the nerve which has no direct power over the muscle is for giving sensation."[33]

[30] *Ibid.*, p. 6. [31] *Ibid.*, p. 25. [32] *Ibid.*, p. 11. [33] *Ibid.*, p. 149.

This eminently valuable discovery does not escape Bell's opinion that here, as elsewhere, we behold Prospective Design in Nature, for he further writes: "I enter upon its examination (i. e., Sensibility and Touch) the more willingly because NOTHING can afford more surprising proofs of design and benevolence in the Author of our being than this property."[34]

In this connection, Leonard Carmichael,[35] quotes the great physiologist, Sherrington, to the effect that Sir Charles Bell was the first definitely to postulate the modern physiological doctrine of the muscle sense and to place this modality on a scientific parity with the five senses of antiquity.

One more example: The name of Johannes Müller is usually associated with the important scientific discovery of The Doctrine of the Specific Energy of Nerves. It must be recorded, however, that Bell at an earlier date considered this problem not only scientifically but also with reference to benevolence and design. In "The Hand," in speaking of the eye, he writes: "If the retina were sensible to the matter of light only from possessing a finer sensibility than the nerve of touch, it would be a source of torment; whereas, it is most *beneficially* provided that it shall not be sensible to pain, nor be capable of conveying any impression to the mind but those which operate according to its proper function producing light and color.[36]

In conclusion, may I point out that in writing the book on "The Hand," Sir Charles Bell brought to it a mind of exceptional acuteness and strong powers of observation, together with a deep religious sense such as has been true from time immemorial of many others engaged in investigations of nature. We have seen how he protests and rebels against sterile materialism. I suspect that his point of view for the time in which he lived served to satisfy his quest for an explanation of the Universe at large as did the Elan Vital of Bergson, the Emergent Evolution of Lloyd Morgan, or the Principle of Organism of Whitehead of more recent times. Bell could not view the Universe as a "bloodless dance of categories;" the Universe

[34] *Ibid.*, p. 120.

[35] Leonard Carmichael, Sir Charles Bell—A Contribution to the History of Physiological Psychology, Psychol. Rev. 33, 1926, p. 204.

[36] *Ibid.*, p. 200.

must be innate with Purpose.[37] In this way he is almost one with a contemporary famous neurologist, Foster Kennedy,[38] who remarks that to attempt to apprehend the stars in terms of a mathematical formula is probably like mistaking an electroencephalogram or a metabolism for the Personality of a poet. It was Huxley[39] in his Essay on the Genealogy of Animals who says that " perhaps the most remarkable service to the philosophy of Biology rendered by Mr. Darwin is the reconciliation of Teleology and Morphology." This means that today before we can *speak* of the teleologist, we must learn to use the *glasses* of the evolutionist.

In closing I draw attention to the Inscription placed on the Tablet in Hallow Churchyard in Worcester which exemplifies the *whole* man.

SACRED TO THE MEMORY
OF
SIR CHARLES BELL
who after unfolding with
unrivalled sagacity, patience and success
the wonderful structure of our mortal
bodies, esteemed lightly of his greatest discoveries
except only as they tended to impress
himself and others with a deeper sense
of
The Infinite Wisdom and Ineffable Goodness
of the
Almighty Creator.

[37] V. F. Storr, Development and Divine Purpose, p. 126, 1906.
[38] Foster Kennedy, Philosophy, vol. XV, 1940, pp. 417-428.
[39] T. H. Huxley, Darwiniana,—1896, p. 110.

THE MEDICAL CARICATURES OF THOMAS ROWLANDSON

T. G. H. DRAKE*

Though a landscape and marine artist and a painter in oils whose portraits found their places on the walls of the Royal Academy in company with the works of Reynolds and Gainsborough, it is as a caricaturist that Thomas Rowlandson is best known. Among the 1300 of his subjects listed by Grego (1) about 50 are of medical interest. From our collection we have selected for illustration certain of Rowlandson's caricatures of medical interest which have not been reproduced or attributed to him by either Hollander (2) or Weber (3) in their books on medical caricatures.

It is to be regretted that Rowlandson is best known by the cruder prints distributed by his Cheapside publishers. In these prints, "Price 1 shilling coloured," large editions were necessary, hence coarse methods of engraving were followed. To conform to the taste of their purchasers, these prints were finished in lurid colours, liberally plastered over the whole etching, background as well as figures. An example, "The last gasp, or toadstools mistaken for mushrooms," published by T. Tegg, Sept. 1, 1813, is shown in Figure 1. In this print, tinted in vivid green, blue, red and yellow, the red, elongated tongues of the gouty old gentleman, his wife and the footman appear to leave no doubt in the doctor's mind but that toadstools have been ingested in place of mushrooms. The look of consternation on the physician's face lends no comfort to the sufferers. The execution and colouring of the present-day newspaper coloured "Funnies" are reminiscent of these caricatures. In fact the coloured funny sections of today are the descendants of these crude caricatures, many of which bear engraved notices, "Folios of Caricatures lent out for the evening."

In contrast to the above type of publication is shown Figure 2, one of Rowlandson's more serious efforts, an example of paediatric interest, "Foundling Hospital, The Chapel." This print, extracted

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from "the Microcosm of London, or London in Miniature," by Pugin & Rowlandson, 3 vols., quarto, published by Ackermann in 1808, is a finely finished aquatint, hand coloured in subdued well balanced tints, the final effect being such that it compares very favorably with a water colour drawing. On account of the method of engraving and superiority of the colouring, fewer more expensive impressions could be obtained from these plates.

The next five illustrations are examples of Rowlandson prints finished in the lurid Cheapside style. "The winding up of the medical report of the Walcheren Expedition, 1810" (Figure 3). From the cartoon it would appear that the medical affairs of this attack in 1809 on Walcheren Island in the Scheldt were as open to criticism as was the actual military conduct of the expedition. The members of the medical board are standing in the stocks. On the green are laid the bodies of casualties, sent home for inspection. The difference between the stores for Walcheren and for home consumption is marked. For Walcheren a medical chest contains, "Candle, snuff and cobwebs, charms for the cure of agues"; casks and bales are labelled "Cobwebs, oak bark, powder of rotten post and tincture of arsenic." For home consumption are many barrels of claret, burgundy and port, and a chest of champagne. The turtle in the right foreground probably refers to the two live turtles which the commander-in-chief for culinary purposes had transported on the expedition in a specially constructed cart.

"Dropsy courting consumption, 1810," published by T. Tegg, Figure 4. Before the slender columned, squat mausoleum an exceedingly corpulent gentleman is on his knees suing for the hand of a tall cadaverous female. In the background, an obese lady and her thin escort are gazing with envy at a statue of Hercules.

"Medical despatch or Doctor Doubledose killing two birds with one stone," Figure 5. This print, though unattributed by either Hollander or Weber, both of whom reproduce it, is by Rowlandson and was published by T. Tegg in 1810. With one hand the physician is carelessly feeling the pulse of the ghastly old sufferer seated in the chair, while, behind her back, his arm is thrown around the neck of the blooming maiden into whose eyes he gazes, his fat features expressing admiration which apparently is reciprocated.

Fig. 1. The last gasp, or Toadstools mistaken for Mushrooms.

Fig. 2. Foundling Hospital, The Chapel.

Fig. 3. The winding up of the medical report of the Walcheren Expedition.

Fig. 4. Dropsy courting consumption.

Fig. 5. Medical dispatch or Doctor Double-dose killing two birds with one stone.

Fig. 6. The anatomist.

Fig. 7. Miseries of human life, a hired nurse.

Fig. 8. A visit to the Doctor.

March 12, 1811, "The Anatomist," published by T. Tegg, Figure 6. It would appear that Dr. Sawbones has disturbed an appointment between his lady and an admirer, who has feigned death, and had himself conveyed into the doctor's house. Dr. Sawbones has announced for the morrow, a course of anatomical lectures, accompanied with dissections. The consternation of the lady and her friend is apparent as the professor unpacks his dissecting kit of saws, knives and scissors to prepare the subject for the next day's demonstration.

In Figure 7 is shown the "Miseries of human life," published 1807, by R. Ackermann's Repository of Arts. As in all prints emanating from Ackermann's establishment, the colouring is superior to that of the Cheapside publishers. "When confined to your bed by sickness—the humours of a hired nurse, who among other attractions likes a drop of comfort—leaves your door wide open—stamps about the chamber like a horse in a boat—slops you as you lie with scalding possets—attacks the fire instead of courting it—falls into a dead sleep the moment before you want her, and then snores you down when you call to her—wakes you at the wrong hour to take your physic, and then gives you a dose of aqua fortis for a composing draught, etc., etc., etc."

Rowlandson, like other etchers of his period, often worked up and engraved the ideas or rough drawings of less experienced draughtsmen. In all cases, though credit is given to the originator, the finished prints are typical of Rowlandson's work and bear little evidence of the amateur's shortcomings. In Figure 8 is shown "A visit to the doctor," drawn by Woodward and engraved by Rowlandson, published by T. Tegg, 1812 (?). The grinning servant has just ushered in to the doctor's consulting room—the chief furniture of which is an enormous bookcase filled with weighty volumes—a robust country couple. The complaint is, "Do you see, Doctor, my dame and I be come to ax your advice—we both of us eat well and drink well, and sleep well—yet still we be somewhat queerish." The bewigged, ruffled physician, cane to nose, is equal to the emergency, and is prepared to remedy all this promptly, "You eat well—you drink well, and you sleep well—very good—you was perfectly right in coming to me, for depend upon it, I will give you something that shall do away with all these things!"

One of the first books illustrated by Rowlandson was "The new Bath guide," by Christopher Anstey, published by S. W. Fores in 1798, from which work the following three illustrations of "The Comforts of Bath" are taken.

In Figure 9 is seen the consultation—

> As we all come for health (as a body may say),
> I sent for the doctor the very next day;
> And the doctor was pleased, though so short was the warning,
> To come to our lodging betimes in the morning:
> He looked very thoughtful and grave to be sure,
> And I said to myself, There's no hope of a cure!
> But I thought I should faint when I saw him, dear Mother,
> Feel my pulse with one hand, and a watch in the other:
> No token of death that is heard in the night
> Could ever have put me so much in a fright:
> Thinks I, 'tis all over, my sentence is past,
> And now he is counting how long I may last.
>
> And so as I grew every day worse and worse,
> The doctor advised me to send for a nurse.
> And the nurse was so willing my health to restore,
> And begged me to send for a few doctors more;
> For when any difficult work's to be done,
> Many heads can despatch it much sooner than one:

Among engravings illustrating the social life of the Spa, attendance at concerts, card games, dances and dinners are two pictures of hydrotherapy. In Figure 10 is seen the pump room, where are gathered the sufferers from dyspepsia, gout, rheumatism, palsy, bilious disorders and cutaneous affections, for all of which the daily drinking of 2 tumblers of the slightly saline iron-containing water drawn from the pumps at temperatures varying from 107° to 116° F. was considered a sovereign remedy. Meanwhile the fashionable throng gossip about their illnesses.

> 'Your servant, Miss Fitchet,' 'Good morning, Miss Stote,'
> 'My dear Lady Riggledum, how is your throat?'
> 'Oh, Fitchet, don't ask me—good heavens, preserve—
> I wish there were no such thing as a nerve;
> Half dead all the night, I protest and declare—
> My dear little Fitchet, who dresses your hair?'

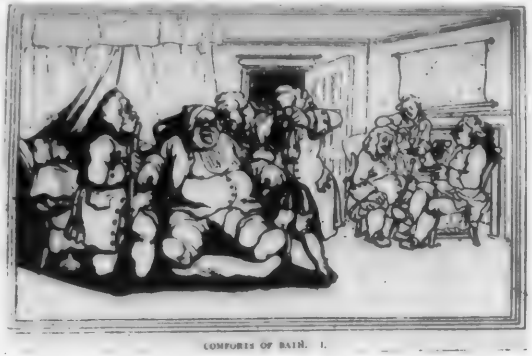

Fig. 9. Comforts of Bath, the Consultation.

Fig. 10. Comforts of Bath, the Pump Room.

Fig. 11. Comforts of Bath, the Hot Baths.

Fig. 12. English Dance of Death, Frontispiece.

In Figure 11 is shown the hot baths. In the late 18th century it was the fashion for ladies and gentlemen to bathe together in powdered wigs and most elaborate costumes. Some of the discomforts incident to bathing are described by Halton (4), "As the result of the entire absence of toilet accommodation at the bathing establishments, patients who resided beyond the immediate precincts of the baths were entirely at the mercy of the sedan chairmen. Visitors were carried in sedan chairs to bathe and back again, without change of clothes, to bed. As one writer remarks, 'Nothing could exceed the helplessness of an invalid, swaddled in a wringing wet bathing dress which he was anxious to change. On this helplessness the chairmen traded. If a fare was obstinate, the door of the chair was fastened on the outside and the inmate became a prisoner. In cases of unusual determination to resist extortion, the top of the chair was removed, and if it happened to be raining smartly, an hour of this treatment was found effectual even in confirmed cases.'"

In 1809, Rowlandson's production of engravings and original drawings had become so large that Ackermann saw that some other outlet for his artistic energies must be obtained or the market would be flooded. As a result, Rowlandson's talents were applied to the illustration of monthly publications, to the mutual profit of Ackermann and himself. Of these publications, the English "Dance of Death," published in monthly parts from 1814 to 1816, and collected in two volumes, royal 8 vo. in 1815 and 1816, "in point of execution leaves nothing to be desired. The entire series may be accepted as a work of higher character, in all respects, than its popular predecessors, the better recognized, 'Tours of Doctor Syntax,' and it is superior, beyond comparison, to the works which followed it." In the introduction the anonymous author (William Combe) sets forth regarding the Dance of Death: "The predominant feature is, without exception, the representation of one or more skeletons, sometimes indeed in grotesque attitudes, and with rather a comic effect, conducting persons of all ranks, conditions, and ages to the tomb. Mr. Rowlandson had contemplated the subject with the view of applying it exclusively to the manners, customs, and character of this country. His pencil has accordingly produced the designs, which in the order they were delivered to me, I have accompanied with metrical illus-

Fig. 13. English Dance of Death. The Quack Doctor.

Fig. 14. English Dance of Death. The Insurance Office.

Fig. 15. English Dance of Death. The Undertaker and the Quack.

Fig. 16. English Dance of Death. The Chamber War.

trations, a mode of proceeding which has been sanctioned by the success of our joint labours in the Tour of Doctor Syntax."

In Figure 12 is seen the frontispiece, Death seated on a globe surrounded by various means of destruction—drugs, compounds, opium, arsenic, gun powder, pistols and edged weapons.

These prints were produced by Ackermann in the same manner as were Rowlandson's superior prints of his Academy period. First Rowlandson prepared a carefully finished drawing. From this he sharply etched on a copper plate the outlines. On a print pulled from this on drawing paper, Rowlandson—using Indian ink—drew in the the shadows and the modelling of the figures. The shadows were then copied on the copper plate by the aquatint process, usually by an engraver who specialized in this particular branch. Rowlandson, using extreme care, next finished his Indian ink shaded impression in harmonious water colours. This copy was then turned over to Ackermann's staff of hand colourists as a master copy for use in colouring prints taken from the aquatinted plate. These colourists, who had been regularly employed for years in this type of work, did their best to produce the effect of the original drawings.

The English Dance of Death, plate 11, "The Quack Doctor," Figure 13.

> Of this grand shop behold the Master,
> Who deals in Bolus, Pill and Plaister.
> See how his visage he disposes,
> As his hands measure out the doses;
> While his round paunch most truly tells,
> He never takes the Drugs he sells.

Meanwhile the patient in the foreground, who is complaining of loss of appetite, observes Death pounding slow poison, and decides,

> I'll take no Drugs that fellow pounds.
> I'd better far, to save my bacon,
> Go back to those I have forsaken,
> And look once more for healing knowledge,
> To the grave Sages of the College.

The English Dance of Death, plate 19, "The Insurance Office," Figure 14. The village squire, accompanied by his wife is applying for life insurance.

The Doctor's called—his eye to throw
On the good Squire from top to toe.
The sage Director stands beside
In dictatorial pomp and pride,
The important scrutiny to guide.
—Doctor, you'll now be pleased to scan
The features of that Gentleman;
And tell us, whether that round paunch
Has been nurs'd up by ham and haunch:
Say, if that vast protruberance
Comes from ill habits, or from chance,
Think you that crimson glow is health,
Or formed by drink, or made by stealth.
These legs, which now appear so stout,
Have they been tickled by the Gout.—
—And, Doctor, for your private ear,
Does not this country Squire appear
Older, at least, by half a year
Than what he has been pleased to state?
—May we trust the certificate?—
To this the Doctor sage agreed.

The insurance policy having been issued, Death decides that if he strikes the Squire immediately, litigation will result; hence, he turns his dart upon another, leaving the Squire for a later day.

The English Dance of Death, plate 23, "The Undertaker and the Quack," Figure 15.

In some old Town—no matter where,
Screwtight had long posses'd the care
Of building houses for the dead,
Either of elm, or oak, or lead,

. . . . . .

A Doctor, who the art had found,
Sometimes, to make a sick man sound;
And also had a cunning trick,
As often, to make sound men sick;
While his Specific, Sovereign Pill,
To cure all ails—would sometimes kill;
As he was one day riding home,
Death fancied to be frolicsome:
And leaping on the Doctor's back
Sat close and snugly, at his back;
And, as they reached Ned Screwtight's door,

Death sneezed—and Nostrum was no more.
Ned bellow'd, as he view'd the sight,
Which put the street into a fright.
This day I never wished to see—
Unlucky for my trade, and me—
His wife exclaim'd—what's all this rout?—
Here, bring him in and lay him out.
What's got into your foolish nob?
The man is dead—and you've a job.—
Screwtight hung down his head and sigh'd.
—You foolish woman he replied—
Old Nostrum, there, stretch'd on the ground,
Was the best friend I ever found.
The good man lies upon his back;
And trade, will now be very slack.
—How shall we undertakers thrive
With Doctors who keep folks alive?
You talk of jobs—I swear 'tis true—
I'd sooner do the job for you.
We've cause to grieve—say what you will;—
For when Quacks die,—they cease to kill.

The English Dance of Death, vol. 2, plate 32, "The Chamber War," Figure 16:

Sir Samuel, as it appears,
Had reach'd the age of four score years.
Lame, weak and deaf and almost blind,
To his arm chair he was confined:
But while there's Life, there's Hope, they say;
And three physicians every day
Came, gravely, for their daily pay.
A nurse too, who her labours plied
In watching sick men till they died,
Had all that time, and longer, been
The Mistress of the Chamber Scene.
She did the sick man's food prepare,
And nurs'd him with unwearied care.

Though the nurse felt that the physicians' medicines were useless.—

But still the Doctors came each day,
And bore their golden Fees away.
They, day by day, when gravely seated,
Order'd their Draughts to be repeated;
Or, to give 'semblance to their skill,
Chang'd these same Draughts into a Pill.

The nurse, however, dumped the prescriptions into the sewer, and

> She then the useless Drugs supplied
> With kitchen Physic, which her pride
> Did, with experienc'd skill provide.

The nurse's conduct came to the physicians' notice and the fight was on.

> Hard words alone, the strife began,
> But soon to blows the contest ran.
> At once, were Canes and Fists upreared
> Bed-pans and Clyster-pipes appear'd:
> Phials and Wigs, in the uproar,
> Were scattered all about the floor.

Fig. 17. English Dance of Death, The Nursery.

In conclusion, in Figure 17 is shown the English Dance of Death, vol. 2, plate 3, "The Nursery." The fashionable mother who has entrusted her infant to a wet nurse for feeding arrives to find Death rocking the infant's cradle while the inebriated wet-nurse snores by its side.

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HIPPOCRATIC ETHICS AND PRESENT DAY TRENDS IN MEDICINE

SAVAS NITTIS

It is incorrect to assume that before Hippocrates appeared, medicine in Greece was nothing but priestcraft and superstition, or under the complete domination of metaphysical speculations. Medicine, more than any other science, reflects the limitations and accomplishments of the times, and Hippocrates appeared at an age when, within the narrow geographical limits of ancient Greece, and within the space of time spanned by a single human life, the human mind reached, in thought and expression, a peak, never before or since equalled. Hippocrates rightly earned the title of "Father of Medicine," not because he founded rational medicine, but because he was the greatest physician during the greatest period of Greek civilization, and because in him rational medicine reached its highest level. Rational medicine was not the outcome of revolution in reasoning, brought about by any one man, or epoch, but a gradual evolution of scientific medical thought, which paralleled in its efforts and achievements the accomplishments of Greek thought in other channels. Demokedes, in 520 B. C., a whole century before Hippocrates, practised, as Herodotus tells us, the kind of medicine we would expect the Hippocratics of any age to practise.[1] True, much pre-Hippocratic medicine was under the influence of priestly religion, but such is the case even today. The secular physician within the temple of Asklepeios, or outside of it, always made use of such rationalism and reasoning, as the times and society created or tolerated. If medicine in Greece succeeded early in freeing itself from the bondage of supernatural beliefs and metaphysical speculations, it is because the various aspects of human knowledge and thought are interdependent. When philosophy dominated the thought, answers to medical problems were sought in philosophical systems. When neither the idealism of Parmenides, nor the materialism of Democritus furnished the answer, the brilliant physician, Empedocles, a generation older than Hippocrates, offered it in the theory of gradual

[1] Herod. 3: 132.

evolution of inherent forces, thus subjugating Medicine to Philosophy, just as Hippocrates later tried to subjugate Philosophy to rational Medicine. However, the Hippocratic statement that "a philosopher physician is the equal of the Gods," is proof that a complete separation was never desired.

The long association of Medicine with Religion and Philosophy proved profitable. Philosophy assisted Medicine in its formation on rational bases, and it prepared the ground for the acceptance of the ethical principles, without which medicine, as the Hippocratics understood it, as it might well be understood by us, could not have existed. What philosophy did for the preparation of the idealistic moral consciousness, religion did for the form, by providing the model for the ritual of the various societies, social, commercial or professional. Such a fraternal organization was the Medical Society of Athens, and for this society Hippocrates himself wrote the Oath in 411 B. C.[2] to serve as its "law," or constitution. Its ritualistic language can be fully explained on these bases without any need to assume that a connection existed between medicine and priesthood at the time of the formulation of the Oath as Castiglioni suggested.[3] How this extraordinary document exerted such great influence on medicine is not fully understood. That it could do so, is very evident. When its influence became recognized and widespread in later years, some saw in it an attempt from within, at some sort of regulation of the practice of medicine. Such an assumption is totally contrary to our understanding of Greek life. Laws, regulating matters of conscience, were never enacted in Greece. Ablutions and purifications and prayers and private conduct were regulated by social demand and not by a Bible. And even the religious beliefs themselves were the outgrowth of popular tradition and superstition. If Homer's or Hesiod's poems served as sources of information, they certainly were never used as Bibles. A moral or ethical code, regulating things medical, could not therefore be imposed from without, and if from

[2] Nittis, Savas. The authorship and probable date of the Hippocratic Oath. Linguistic and philological consideration of the ἐνγγραφή, with a short history of Greek fraternal societies. *Bull. Hist. Medicine*, 8: 1012, July 1940.

[3] Castiglioni, A. A History of Medicine. Edited and translated by E. B. Krumbhaar. Knopf, 1941, New York.

within, it could not claim validity in all Greek states. At best, it could be valid in the city where it had been formulated. We know there was a provision in the Solonian Law, which declared valid, whatever the members of a fraternity imposed upon themselves by common agreement.[4] But whatever the necessity for the formulation of the Oath was, its intention, as it can readily be seen, was not to regulate the conduct of the members of the profession in all its particulars, but rather a general attempt at the expression of an ideal. It is likewise absurd to suppose that the discrepancy between the ethical ideals of the profession and the actual conduct of many physicians, prompted the author of the Oath to set down a model moral code. Such discrepancies existed and exist in all professions. If those of the medical profession provoked more caustic and satirical comments, it is on account of the general interest their very nature evokes.

Like the Sermon on the Mount, the Oath is the expression of an ideal. It deliberately neglects the social and personal needs of the individual, and rises above the beliefs of the philosophers and the tolerance of the secular law. It puts an injunction to both murder, which Plato counselled, and to abortion, which Aristotle advocated, and condemns the mutilation of castration for any reason, admonishing the physician in the strongest terms found in the document, to abstain from even social intercourse "with men who make this practice their business."[5]

This idealistic and impersonal code of ethics was supplemented by other writings of the Hippocratics and their accepted representatives who followed after them. In direct line of succession, holding steadfast to the ideals of the Oath, modern medicine evolved, and the Hippocratic rationalism with which it became identified and distinguished from pre-Hippocratic medicine, still distinguishes and identifies true medicine from the various paramedical quackeries and medico-religious sects.

As of old, the medical society of today jealously guards the sanctum of science against corruption from within and assault from without.

[4] Diagest. XLVII, 22, De collegiis et corporibus.

[5] Nittis, Savas: The hippocratic Oath in reference to lithotomy. A new interpretation with historical notes on castration. *Bull. Hist. Medicine*, 7:719, July, 1939.

And as of old, in theory, at least, it claims no exclusiveness. Those outside the organized group should enjoy the benefits of the unified efforts of the organized group. Discrimination against any physician, by any society, hospital, or other medical organization, solely because of non-membership, should be deplored as much, as the physician's failure to join in the efforts of the organized group, to further the interests of impersonal medicine and improve its educational standards. Such discriminations, unfortunately, do occur, while the representatives of organized medicine, either applaud, or look in the opposite direction. And while the abuses of labor unions are deplored, some medical societies duplicate their practices.

Violators of the Oath, in search for moral readjustments, frequently refer to the " secrecy clause," as an example of the impossibility of maintaining the Hippocratic ideal in modern society. Only misinterpretation of the text would admit discrepancy. " What ought not be spoken abroad," means just that. It is with particular satisfaction that I noted that this is the official interpretation, adopted by the Principles of Medical Ethics, of the American Medical Association. When modern society found it necessary, for its own protection, to enact laws, making it mandatory for the physician to report and register certain diseases, it was at the recommendation, and in most cases the urgent insistence, of the medical profession, that such laws were enacted.

Such are the truths expressed in this extraordinary and marvellously compact document, that they have withstood the test of time and geographical space, being modified only whenever and wherever they could not be understood.

Medicine has advanced and expanded, since the time of Hippocrates, and no single mind can contain it all. However, the official representatives of the profession kept steadfast to the rule that medicine is one. The basic knowledge, or the principles underlying its teachings, should be possessed and accepted by all. If there should be specialization, it should be in addition and not at exclusion. Organized medicine encouraged and helped the specialization in certain exclusive branches, where the time invested in accumulation of unnecessary knowledge, could be utilized for the acquisition of specialized information or technical skill. And what happened with

Dentistry and Pharmacology yesterday, should serve as models for Ophthalmology tomorrow, or other future subdivisions, should such necessity arise. A subdivision from within, not an imposition from without, based on aberrant doctrines.

Many questions come to the mind of the present day Hippocratic physician, with the introduction of the Specialty Boards. With a body of high-minded physicians, whose aim is to further and raise the standards of medical education and practice, one has no quarrel. But there should be no restrictions, but broadmindedness; no exclusiveness, but liberality and openmindedness. Recognized specialists of unquestioned ability and high professional and ethical standards, formed their respective boards. However, receiving recognition from the American Medical Association is the only link officially connecting the boards with the rest of the medical fraternity. The "guild" spirit is already discernible in some, and in competing for superiority of apparent standards, others have lost sight of the measured reasonableness.

If four years in a medical school, shortened to three under the present war stress, followed by another year's interneship, is sufficient to provide the candidate with the necessary knowledge to practise medicine in all its branches, why, one asks, does it take an additional minimum of three years' learning to master the specialty of Anaesthesia, which, even today, in most good hospitals,—unwisely, I am the first to admit,—is satisfactorily practised by nurses, who learned the art in something like six months' training? How much a good idea can be abused is best illustrated by a perusal of the rules of the Board of Obstetrics and Gynecology. Seven years after the interneship are required for certification in a specialty, half of which concerns itself with presiding over a physiologic function of the human female body. The useful midwife was accused of incompetency, and instead of being made competent, was eliminated. The much more incompetent general practitioner took her place, and now the busy specialist wants hospital deliveries only.[6]

Specialization should be inclusive, not exclusive. The physician who acquired extraordinary skill in one branch of medicine, did so,

[6] Miller, N. F.: The perpetuation of errors in Obstetrics and Gynecology. *J. A. M. A.*, 117: 905, Sept. 13, 1941.

not at the expense of a prepossessed skill in another branch of medicine, but in addition. But where does the "General Practice Specialist" fit? And what would the existence of the "Hospital Administration Specialist" prove, except that the limits of the reasonable merge, at times, with those of the absurd. Karsner[7] called attention to the inherent danger in the formation of a guild, or in modern terms, a "labor union," and he deplored the proposal that hospitals accept on their staff only those certified by the boards. How far these abuses can be carried was exemplified recently in Michigan, where physicians, not certified by the Board of Orthopedic Surgery, were excluded from a health program supported by public funds. The explanation given was that "poor children must have the best care," a careless implication that such good care is denied to patients paying out of their own funds, for professional services rendered by a non-certified surgeon. Such abuses are of course the exception and not the rule.

The stress of the importance of certification is responsible for an abuse beginning to be felt in other directions,—the exploitation of the young graduates. The long post graduate period demanded for specialization in certain fields, is in the majority of cases and in most places, properly utilized, and the time of the preceptor or teacher, and the funds of the institution generously given. Unfortunately, this is not universally the case, and the long period of apprenticeship serves only as a dishonest excuse to provide the institution and the busy practitioner with competent help, gratis.

It is not the purpose of this paper to suggest solutions to these problems. However, the opinion is expressed that a central board, composed of specialists in all fields should be formed, preferably by, or through the American Medical Association, to establish and supervise uniform standards.

Castration is today practised in many civilized countries, including many States in our Union. Laws, so called "eugenic," govern the practice of this abomination, euphemistically called "sterilization" now. In many cases it was organized medicine that assisted, or insisted, in the promulgation of such laws. Today, physicians en-

[7] Karsner, H. T.: A pathologist scrutinizes the Specialty Boards. *J. A. M. A.*, 117: 1, July 5, 1941.

gaged in this practise, do not even find it necessary to attempt to reconcile morality with the presumed social needs. How far more conscious of wrong doing were Paul of Aegina and his Arab imitators, who, in describing how the operation ought to be performed, at least tried to ease their conscience. "Although the aim of Medicine is to correct and not to corrupt nature, the physician, nevertheless, at times, finds himself compelled by those in authority to perform castration." [6] Protection of society from the criminal, be he sane or insane, should be the business of the judicial, and not the medical profession. The physician, after pointing to the proper authorities the dangers to society from an active or potential criminal, should end his mission there. Incarceration, or institutional care, will protect society adequately. The argument that the loss of liberty is a far more cruel or harsh measure than the loss of propagation powers, offers no reconciliation.

It is hardly necessary to mention abortion here. No civil legalization will ever make it legal in the medical, or even the lay moral conscience. Even teleologic arguments cannot be offered for its support. The term "therapeutic abortion" is an escape, not an excuse.

Hippocratic Medicine does not find it necessary to make moral readjustments in the modern State. Whenever it attempted to do so, it found itself in divergence with the opinion of many of its followers. Medicine is a privileged profession. Privileged even in the fact that from the very beginning of its foundation, it was provided with a constitution, or law, which in compactness and lofty conceptions of morality, takes second place only to the Sermon on the Mount. It stood the test of time for two and one-half millenniums. We should try to preserve it inviolable, lest we should do violence to what is most sacred within us.

[6] Paul Aeginita. 6, 28, on Castration.

CHANGING ATTITUDES OF THE MEDICAL PROFESSION TO SPECIALIZATION

GEORGE ROSEN

Specialism is an essential feature of modern medical practice and a considerable proportion of all physicians limit their work to one field. But specialization of function in the recognition and treatment of disease is not restricted to modern times, or to social and economic systems of a high degree of complexity. Vocational specialism is widespread in primitive groups, and specialization in the practice of leechcraft is by no means uncommon among them.[1] However, such forms of specialization follow other cultural laws than does the modern type, and need therefore not be considered here.

Medical specialism in its modern form is a product of the 19th century, so that this study will be limited almost exclusively to this period, except for occasional references to the present century. The purpose of this report is to present an analysis of the varying reactions of physicians to the rise and development of an innovating form of medical practice, namely, medical specialization, and to investigate the social, economic, and psychological factors involved therein.

Specialization in Europe dates back to the beginning of the 19th century, and it did not become prominent on the American medical scene until after 1850. Nevertheless, the reception accorded to this form of practice both here and abroad was practically the same. The mass of the profession responded to this new tendency with open hostility, or at best, viewed it with suspicion. Opposition to innovation in a given situation arises from the intimate interaction of cultural and psychological factors, the cultural providing the historical

[1] For specialization among primitive groups see:

a) Willard Z. Park: *Shamanism in Western North America, A Study in Cultural Relationships* (Northwestern University Studies in the Social Sciences no. 2), 1938, p. 97 ff.

b) Robert Redfield: *The Folk Culture of Yucatan*, 1941, chap. XI.

c) E. E. Evans-Pritchard: *Witchcraft, Oracles and Magic among the Azande*, 1937, Parts II, IV.

d) W. H. R. Rivers: *Social Organization*, 1932, p. 148.

and social setting which arouses specific psychological attitudes in the participating individuals.[2] Consequently, if we wish to explain this attitude of antagonism, we must analyze the socio-historical circumstances that engendered it.

Ophthalmology was one of the first medical specialties; and the earlier ophthalmic literature, especially in England, contains much that is relevant to our subject. An examination of the sentiments expressed by both the opponents and the advocates of ophthalmic specialization reveals some of the basic factors involved in the antagonism and suspicion evoked by the appearance of this type of practice.

Until the eighteenth century the diseases of the eye had received almost no attention from the regular medical profession, with the result that this field of medical activity had been preempted by quacks. In his *Great Surgery* published in the fifteenth century, Guy de Chauliac told his readers that because of the uncertainty of the outcome, all discreet practitioners ought to leave cataract operations to itinerant healers, and similar sentiments were expressed by other medieval physicians.[3] One of the largest groups among these itinerant empirics were the "oculists" and "cataract couchers," of whom Georg Bartisch, in his book on the care of the eyes published in 1583, says: "Nor is there a lack of old women, vagrant hags, theriac sellers, teeth pullers, ruined shopkeepers, rat-and-mouse catchers, knaves, tinkers, hog butchers, hangmen, bum-bailiffs, and other wanton, insolent, good for nothing vagabonds, all of whom boldly try to perform this noble cure. Some of them, and they are by no means few in number, make their appearance at certain times and attract attention to themselves by means of magnificent clothing, precious gold and silver, many servants and horses, excessive ostentation, and by creating a great stir, so that many good folk have not only been shamefully and evilly swindled, but also excessively overcharged, and, in addition, even ruined and caused to lose their lives." Finally Bartisch admonishes the authorities not to allow

[2] Bernhard J. Stern: "Resistance to the Adoption of Technological Innovations," in: *Technological Trends and National Policy*, 1937, p. 59.

[3] Hermann Peters: *Der Arzt und die Heilkunst in der deutschen Vergangenheit* (2te Auflage), 1924, p. 42.

patients having eye diseases " to fall into the hands of such irresponsible destroyers and murderers of eyes." [4] Similar accusations are made by Richard Banister, an English contemporary of Bartisch. In his *One Hundred and Thirteen Diseases of the Eyes and Eye-Liddes* published at London in 1622, he also holds up to ridicule and contempt these itinerant practitioners and their ways. " They take their patients," he says, " into open markets and there for vain glories sake, make them see, hurting the patient only to make the people wonder at their rare skill. Some others make scaffolds on purpose to execute their skill upon, as the French-men and the Irish-man did in the Strand, making a trumpet to be blown before they went about their work." [5] The eighteenth century produced the most notorious of these gentry, the self-styled Chevalier Taylor, who travelled about Europe extolling his merits and accumulating patients and wealth.[6]

These conditions persisted throughout the seventeenth and eighteenth centuries in England and on the Continent, and references to disreputable oculists who went from town to town practising their art are not uncommon during the first decades of the nineteenth century.[7] In the United States such itinerant charlatans continued their activities until well into the latter part of the century.[8]

The disrepute of these peripatetic oculists and of other practi-

[4] Cited by Peters, *op. cit.*, pp. 84-85.

[5] Cited in Casey A. Wood: *Address on an Exhibit of Early (Prior to 1860) British and American Ophthalmic Literature.* Jour. Amer. Med. Assoc., November 8 and 15, 1902.

[6] For some accounts of Chevalier Taylor's travels in Germany see: Eberhard Buchner: *Aerzte und Kurpfuscher. Kulturhistorisch interessante Dokumente aus alten deutschen Zeitungen (17. und 18. Jahrhundert)*, 1922, pp. 73-4; 75-87.

[7] See Lancet XI, 1827, p. 423 for reference to John Williams, itinerant oculist; his book, *Traité des Maladies des Yeux*, Paris 1815, is a good example of the literature produced by such men.

[8] Wyndham B. Blanton: *Medicine in Virginia in the Nineteenth Century*, 1933, p. 194; Indiana State Medical Society, *Report of Dr. Parvin of Indianapolis on Diseases of the Eye and Ear*, Cincinnati Medical Observer, vol, 2, 1857, p. 413; W. H. Byford: *Specialties and Specialists*, Cincinnati Medical Observer, vol. 2, 1857, p. 213; E. Williams: *Kyklitis or Inflammation of the Corpus Ciliare*, Cincinnati Medical Observer, vol. 2, 1857, p. 14; *Specialists and Specialism*, St. Louis, Courier of Medicine, I, 1879, p. 435; Louis Bauer: *On the Declining Relations of the Medical Profession to the Public*, Cincinnati Medical Observer, vol. 2, 1857, pp. 101-105.

tioners of the same ilk was so great that when certain men within the medical profession itself began to devote themselves to the diseases of some organ such as the eye, or to a particular class of diseases, they did so at the risk of inviting aspersions upon their professional integrity and of being ostracized by their colleagues. There can be little doubt that group pressure, operating in the form of specific social sanctions such as ostracism, was indeed effective in retarding the rise of specialties. Benjamin Travers, one of the early English practitioners of ophthalmology, asserted in 1821: "In this country, I believe no one before myself, who designed to practice general surgery, ventured to give more than a cursory attention to the diseases of the eye. A fear of being disqualified in public opinion, by a reputation acquired in these, for the treatment of other diseases, was a motive, however groundless, sufficient to deter surgeons from the cultivation of a large and legitimate field of observation and practice." [9]

Furthermore, opposition to specialization was frequently justified on the ground that since medical science is unique and indivisible, the practice of medicine should be the same. Thus in 1812 the *Edinburgh Medical and Surgical Journal* reviewed a book by John Stevenson entitled *On the Morbid Sensibility of the Eye, commonly called Weakness of Sight*. In the introduction to this work Stevenson clearly dissociated himself from the quacks, and informed the reader that he had "for some time past, altogether relinquished *general* practice (*in the exercise* of which I have been for many years extensively engaged) for the express purpose of devoting my attention exclusively to the management of the eye and ear." [10] The reviewer,

[9] Benjamin Travers: *A Synopsis of the Diseases of the Eye and their Treatment* (London), 1821, pp. V-XIII. For a typical expression of opposition to specialization in Great Britain see *Edinburgh Medical and Surgical Journal*, vol. 8, 1812, pp. 362-364. Representative examples of American opposition to specialization are the following:

a) A.: *Observations on Specialties in Medicine*, Peninsular and Independent Medical Journal, vol. II, 1859, pp. 1-5.

b) Ashbel Woodward: *Specialism in Medicine*, Proceedings and Medical Communications of the Connecticut Medical Society, vol. II, 1867, pp. 264-268.

[10] John Stevenson: *On the Morbid Sensibility of the Eye, commonly called Weakness of Sight*, 1810, p. 3.

however, rebuked Stevenson for his temerity, remarking that if he had been "acquainted with the history of medicine, and of those men who have contributed most to its improvement, he surely could not have ventured to intrude such sentiments before the public. We have always conceived, and our opinion is not a singular one, that the practice of the medical art, and the study of the science of medicine, were one and the same, and that diseases of any particular organ could not be treated with ability and skill, but by those who had acquired an excessive knowledge of the diseases of the whole body. Upon these general principles we have always condemned those who have pretended that any knowledge could be obtained in the diseases and treatment of a particular organ, by practicing on that organ alone, which the general practitioner might not acquire." [11]

It should be noted that ophthalmology during the eighteenth and early nineteenth centuries was almost exclusively ophthalmic surgery and was practised by general surgeons, such as William Cheselden, Lorenz Heister, A. G. Richter, Antonio Scarpa, and Astley Paston Cooper. The conviction prevailed that no one could treat eye diseases successfully unless he practised general surgery. As Samuel Cooper put it in 1815: "No one, except the thorough surgeon, can make the complete oculist . . . ," [12] a sentiment which we find echoed with approval by Travers, Middlemore, and others. In 1832 William Lawrence asserted that not only was the study of ophthalmology inseparable from general medicine, but that also the practical treatment of the eye diseases was best handled by those who regularly treated diseases of the entire body.[13] This attitude likewise finds expression in the rules of the Royal Westminster Eye Infirmary, which required "that every surgeon belonging to it shall 'also be the surgeon or assistant surgeon of an hospital for the treatment of diseases generally.'" [14] Further indications of this attitude are evident in the reluctance with which men, such as William Bowman, became specialists, as well as in the actions of Benjamin Travers

[11] Edinburgh Medical and Surgical Journal, vol. 8, 1812, pp. 362-364.

[12] Cited by Travers, *op. cit.*, pp. V ff.

[13] Richard Middlemore: *A Treatise on the Disease of the Eye and its Appendages*, 2 vols., 1835; John Vetch: *Practical Treatise on the Dieseases of the Eye*, 1820, p. VII ff.; Wardrop: *Lectures on Surgery* etc., Lancet, 1833, p. 456.

[14] *Intercepted Letters*, Lancet, 1833-34 (I), p. 188.

and William Lawrence, who severed their connections with the London Eye Infirmary after seven and twelve years respectively, while continuing to maintain their connections with general hospitals for many years.[15]

Economic competition was undoubtedly an extremely important, if not a basic factor in the hostility evinced by the general practitioner to the appearance and multiplication of specialists. At a time when the economic situation of the medical profession was, on the whole, a difficult one, and the average practitioner often had a hard time of it, the success of the specialist was bound to arouse professional suspicion and resentment.[16] The general practitioner felt that the specialist's activities tended to degrade him in public opinion, and by narrowing his sphere of action to injure him pecuniarily. The conflict situation created by this intra-professional competition appears most openly in the American discussions of specialization and its problems. In 1869 the Committee on Specialties of the American Medical Association in its report at the annual meeting pointed out that: "The chief objection brought against specialties is, that they operate unfairly toward the general practitioner, in implying that he is incompetent to properly treat certain classes of diseases, and narrowing his field of practice." [17] At about the same time an editorial in a New York medical journal made it clear that: "The profession cannot be expected to listen to aspersions upon their judgment and skill, without imbibing a prejudice against the source from which they spring." [18] Several years later, in 1875, at the

[15] J. Hirschberg: *Geschichte der Augenheilkunde*, in: Handbuch der gesamten Augenheilkunde (2te Auflage), Band 14, Abteil. 4, Kap. XXIII (England's Augenaerzte, von 1800 bis 1850), pp. 10-14.

[16] On the economic situation of the medical profession:

a) Richard H. Shryock: *The Development of Modern Medicine*, 1936, pp. 257-8;

b) Richard H. Shryock (ed.): *The Arnold Letters* (Papers of the Trinity College Hist. Soc., XVIII-XIX), 1929, p. 164;

c) George Rosen: *Some Economic Aspects of Medical Practice in 19th century America* (unpublished manuscript).

[17] *Report of the Committee on Specialties, and on the Propriety of Specialists Advertising*, Trans. Amer. Med. Assoc., vol. 20, 1869, pp. 111-113.

[18] *Specialties and Specialists*, The Medical Record, vol. I, 1866-67, p. 525. See also *Advertisements by Physicians*, Boston Medical and Surgical Journal, vol. 71, 1864-65, p. 484.

annual meeting of the New York State Medical Society, the report of the Committee on the President's Address, as presented by Abraham Jacobi, maintained that the tendency to specialization tended "to degrade the general practitioner in the estimation of the public." [19] Nevertheless, by this time it was becoming increasingly obvious that the opponents of specialization were fighting a hopeless rearguard action which could have but one result.

Before leaving our analysis of the opposition to specialization, consideration must be given to one other retarding factor which was operative, especially in the fields of practice dealing with venereal and genito-urinary diseases. The moral sanctions and the concepts of sin with which western society, particularly in England and America, surrounded sex relations exerted a definite influence on the attitudes of the medical profession as well as of the lay public to practitioners devoting themselves to diseases of the genito-urinary organs. The social disapprobation which was the lot of the unfortunate victims of syphilis and gonorrhea was extended in greater or lesser degree to the physicians to whom they turned for treatment. The result was that a great many men refused in their private practices to treat such patients, driving them into the hands of quacks and unscrupulous practitioners. An editorial in the *Lancet* for 1857 informs us: "It has been tacitly agreed, that syphilis and cognate diseases were not exactly the most desirable to treat; that it was all very well in a foul ward at an hospital but that a large reputation for skill in such cases was rather to be eschewed as being not quite gentlemanly, and smacking somewhat of immorality. When sufferers look about them for relief, the result is that very few men are recognizable as specially skilled in this department of practice. Their attention is thus diverted from legitimate practitioners, and the advertising columns of the lay press are consulted with a view of selecting one from amongst those who, although obviously not of us, at all events assert loudly enough their qualifications for the cure of disease, with all the concomitant little *agreements* of *secrecy, speedy cure, contract,* and so on. By dint of long usage, a blot has at last fixed itself upon the branch of practice

[19] Annual Meeting of the Medical Society of the State of New York. Medical Recorder, vol. 10, 1875, p. 108.

which, above all others, requires the devotion to it of men of the highest character." [20]

A typical example of the consequences resulting from the situation described by the Lancet may be seen in the following advertisement from the Washington *Evening Star* of March 12, 1863:

SECRET DISEASES

Dr. H. E. Forrest Cures all Diseases of Imprudence, no matter how long contracted, or will receive no pay. He has now had several years experience in military hospitals in Europe, and warrants to cure any of the above diseases. Office hours, 12 to 4 and 6 to 10. Private rooms for consultations with ladies. Consultations free. 1st. north, between 7th and 8th sts. (3 story brick, name on the door).[21]

The persistence of such attitudes until very recently, and their retarding influence on the development of a specialty such as urology are strikingly presented in remarks made in 1911 by members of the American Urological Association at the tenth annual meeting of the organization. At this meeting Hugh Cabot of Boston defended the right of urology to be considered a specialty.[22] In the discussion following Cabot's address, the urologists "let their hair down," and a number of very illuminating comments were voiced. Dr. Ernst G. Mark of Kansas City asserted "that we men who are making a specialty of urology should discountenance the old idea of the 'clap doctor.' That is where urology first got its black eye." [23] Dr. G. Frank Lydston of Chicago commented along similar lines. "It is not very long," he said, "since the term 'urology' was not known; and the genito-urinary surgeon was regarded as a 'clap doctor.' At the beginning, my own college clinic was largely devoted to entomological researches in crab lice. Strictures occasionally strayed in to be operated. With the competition of half a dozen general surgeons it was very difficult to build up a clinic." [24] To the remarks of his colleagues Dr. Granville MacGowan of Los Angeles added the following: "I think my friend Mark has hit the keynote in regard

[20] Lancet, vol. II (Saturday, Sept. 12), 1857.

[21] Washington *Evening Star*, March 12, 1863, p. 3, column 4 (Personal).

[22] Hugh Cabot: *Is urology entitled to be regarded as a specialty?* Trans. Amer. Urological Assoc., vol. V, 1911, pp. 1-10.

[23] Trans. Amer. Urolog. Association, vol. V, 1911, p. 14.

[24] *Ibid.*, p. 15.

to the other thing. We treat the clap. You know how the public regard the question of gonorrhea, a shameful disease which anybody should cure easily, while it really is probably the most serious disease which affects mankind. . . . The public do not know this, they do not appreciate this, they have no idea of it, and so if a large proportion of a man's practice is taken up in treating what appears to them a trivial disease, they judge him accordingly. And if it were possible for us to cut it out of our practice, I think that our standing with them would be different." [25]

Although our analysis of the factors underlying medical hostility and opposition to specialization is by no means complete, yet enough evidence has been presented to show that such attitudes were due in large part to reactions implicit in group behavior.[26] Innovations in medical activity, just as in other forms of human behavior, arouse resentment because they upset established ways of thought and action, and disrupt stable relationships, in short, the mores of the group. The resultant psychological response evoked in most of the members of the group is a feeling of impropriety, since dissent from the mores is considered detrimental to the welfare of the whole group. Furthermore, within a given social milieu a process of social evaluation is constantly at work as a result of which values become attached to individuals and groups carrying on certain activities and operations. The product of this process is a prestige scale, in terms of which individuals or groups are given a particular status. As a result, "any person who has achieved a certain rank in the prestige scale regards anything real or imaginery which tends to alter his status adversely" with latent or manifest hostility.[27] This self-interest of the individual or the group in the maintenance of status is most consciously involved and expressed in the economic field. Finally, as we have seen, the social pressure exerted upon innovators in endeavoring to coerce them to uniformity with the rest of the group takes the forms of ridicule, disparagement, social ostracism, and often economic discrimination.[28]

[25] *Ibid.*, p. 17.

[26] Stern, *op. cit.*, pp. 59-62; William G. Sumner: *Folkways*, 1913, pp. 75-118.

[27] F. J. Roethlisberger, and William J. Dickson: *Management and the Worker*, 1941, p. 556, also see all of chap. XXIV.

[28] Stern, *op. cit.*, p. 62.

Nevertheless, despite the vehemence of its exponents opposition to specialization was doomed to defeat. By the forties of the nineteenth century medical specialism, particularly in ophthalmology and otology, had already achieved a certain degree of respectability in Great Britain. In evidence of this fact we have the statement made in 1845 by William R. W. Wilde, one of the greatest otologists of the century, "that highly-educated medical men now apply themselves to the study and treatment of eye diseases solely." [29] Indications that the attitude of the American medical profession was becoming more favorable toward specialization were already prevalent throughout the decade of the sixties, yet this type of medical activity did not achieve official recognition until 1869 when the American Medical Association resolved "that this Association recognizes specialties as proper and legitimate fields of practice." [30] Not quite a decade later specialism was already regarded as inevitable.[31]

While we cannot enter into a detailed analysis of the factors which brought about this change in the attitude of the medical profession in Britain and America, a brief survey of the more important forces that were active in effecting this transformation will undoubtedly throw some light upon the entire process. In 1886 William Brodie, president of the American Medical Association, stated very frankly that the members of the profession "began to realize that by devoting themselves to one branch instead of working up a general practice, they could often do more good, earn more money, and have less arduous work to perform." [32] The great significance of the economic factor in bringing about a change in the attitude of the profession to specialization is attested by many writers on the subject.[33]

[29] W. R. W. Wilde: *Introductory Address delivered at the School of Medicine, Park-Street, Dublin, 1845*, Lancet, vol. I, 1845, p. 434; for an early instance of the recognition of certain specialties ("diseases of the chest, eye, ear, in practice, and orthopedy in surgery") in the United States see Byford, *op. cit.*, p. 212.

[30] Trans. Amer. Med. Assoc., vol. 20, 1869, pp. 28-29.

[31] Richard M'Sherry: *Notes on Relations between General Practice and Specialties in Medicine*, Maryland Medical Journal, vol. 2, 1877, p. 278; John S. Apperson: *Report on Advances in Practice of Medicine*, Transactions of the Medical Society of Virginia, 1886, pp. 88-91.

[32] Apperson, *op. cit.*, pp. 88-91.

[33] *Medical Record*, vol. 10, 1875, p. 105, 158, 255, 489; E. D. Forée, *Specialism in Medicine*, American Practitioner, 1876, p. 260; *Specialists, their Relations to*

Specialism was profitable because patients were willing to pay for the services of men who were able to relieve conditions which general practitioners did not know how to treat.[34] The active rôle of the public in furthering the growth of specialization is amply confirmed by British, American and European writers.[35] Typical is the statement of Sir William Bowman in a letter to his friend T. Pridgin Teale. " The ophthalmic field," he wrote, " was entered on gradually. . . . The public found me out. I could not have long followed both departments." [36]

A third factor making for specialization, and one which has been so generally accepted that we need but mention it here, was the tremendous expansion of medical knowledge and technique.

Furthermore, it is apparent that the social climate of opinion within which innovating factors and forces act will tend to retard or to expedite their operation depending on whether they are in accord with or in opposition to this climate of opinion. It should be recalled that throughout the greater part of the nineteenth century there prevailed a profound faith in progress as a result of the division of labor. The identification of medical specialization with this belief in progress and the beneficial effects of a division of labor made for a readier acceptance of this type of practice.[37]

General Practitioners, St. Louis Courier of Medicine, vol. I, 1879, pp. 324-329; Wilde, *op. cit.*, p. 434; Lancet, vol. II (Saturday, Sept. 12), 1857.

[34] George Hunter: *The Place of Specialism in General Practice* . . . Transactions of the Medico-Chirurgical Society of Edinburgh, vol. IV, 1885, p. 232 ff.; vol. VII, 1887-88, p. 76 ff.; Cincinnati Medical Observer, vol. 2, 1857, p. 413, 104-105; Virginia Medical Monthly, vol. II, 1875-6, pp. 419-22; Toledo Med. and Surg. Jour., vol. III, 1879, pp. 449-455.

[35] For an early recognition of this fact see Wilde, *op. cit.*, p. 434.

[36] T. Pridgin Teale: *Abandonment of Iridectomy in the Extraction of Hard Cataract*, Transactions of the Ophthalmological Society of the United Kingdom, vol. XIII, 1893, pp. 2-4. Although no attention has been given in the present study to developments on the Continent yet many of the factors and processes involved in the recognition of medical specialization were the same as in Britain and America. For the rôle of the public in France in 1853 see Dr. O. Heyfelder: *Reisebericht. Die Specialitäten in Paris*, Deutsche Klinik, 1853, pp. 391-392, also pp. 35-36; a similar picture is presented in a report published a decade later, see Heinrich Rohlfs: *Ueber den Specialismus in der Medizin*, Deutsche Klinik, 1862, p. 84.

[37] Gudmund J. Gislason: *Specialization in Medicine*, Journal-Lancet, vol. 40, 1920, pp. 545-46; Ross R. Bunting: *Specialism in Medicine*, Maryland Medical Journal, 1887, pp. 413-415; *The Position of the Specialist in Respect to the General*

Finally, it should be pointed out that the readiness with which innovation is accepted depends also on how closely the new resembles the old.[38] Recognition of innovation is made easier by the existence of transitional forms that permit the process of habituation to operate. Medical specialism was rendered more acceptable to the profession through the mediation of the type of practice known as partial specialization, which made it possible for the general practitioner to meet the competition of the full specialist on more equal terms.[39]

As a result of the preceding analysis, although it is by no means complete, one seems justified in concluding that change in medicine as in other aspects of human life is a complex process involving the interaction of social, economic, psychological and scientific elements, a process which must be investigated if we are to obtain a real insight into the history of medicine and the bearing of this history upon the problems of present-day medicine.

Practitioner, St. Louis Courier of Medicine, I, 1879, p. 588; Joseph Sandek: *The Relative Position existing between the General Practitioner and the Specialist*, Virginia Medical Monthly, vol. II, 1875-76, p. 419; Trans. Amer. Med. Assoc., vol. 20, 1869, p. 111.

[38] Stern, *op. cit.*, p. 61.

[39] Virginia Clinical Record, vol. 3, 1879, p. 189; Walter Rivington: *The Medical Profession*, 1879, pp. 53-54; Boston Medical and Surgical Journal, vol. 71, 1864-65, p. 485.

WILLIAM WITHERING: HIS WORK, HIS HEALTH, HIS FRIENDS

LEWIS J. MOORMAN

William Withering, born at Wellington in Shropshire, England, March 17, 1741, received a rich family heritage. His father was a beloved country doctor with a creditable ancestry. His mother came from a family of well-known physicians; her father, Dr. George Hector, enjoyed the distinction of having brought Dr. Samuel Johnson into the world. Obviously the parental influence was conservative, providing a home life of refinement and freedom, guarded by subtle discipline.

Though his educational opportunities were considered only average, and his response to the same unremarkable, he was accepted by the University of Edinburgh for the study of medicine. In addition to his splendid background for a medical career, he was blessed with what Lord Moynihan would call "a valuable collateral pursuit." He played the flute and the harpsichord. No doubt this musical gift, his personal charm and his euphonious name helped to open many doors which otherwise might have remained closed. It is said that "he soon felt at home in the agreeable society of the picturesque old capital of Scotland." He learned to play the bagpipe and became a golfer. In this way he found wholesome recreation and made many life long friends while securing a medical education.

It was a good day for the student of medicine at the University of Edinburgh. In anatomy there was Alexander Monro, primus, and his son Alexander, secundus; in the practice of medicine the inimitable William Cullen; in chemistry Joseph Black, the discoverer of carbonic acid gas and the author of the doctrine of latent and specific heat. In neurology, Robert Whytt, England's outstanding student of neurology and author of an important work on hysteria. Strange as it may seem, Dr. John Hope, in botany, had failed to interest this young man who was destined to be the greatest of all medical botanists.

During his second year Withering wrote his parents: "The Bo-

tanical Professor gives annually a golden medal to such of his pupils as are most industrious in that branch of science. An incitement of this kind is often productive of the greatest emulation in young minds, though, I confess, it will hardly have charm enough to banish the disagreeable ideas I have formed of the study of botany."

Among his intimate friends was Richard Pulteney, who later became a member of the Royal Society and author of *The Historical and Biographical Sketches of the History of Botany in England.* Pulteney was also the first English biographer of Linnaeus. Possibly it was through this friendship, rather than the teachings of Dr. Hope, that William Withering's latent botanical interests were preserved.

His first vacation was spent at home with Thomas Arnold, afterwards the author of a book on mental diseases, as his guest. They returned to the University on horseback, stopping at York, the birthplace of Robinson Crusoe. Pausing for sightseeing, they secured the guidance of a young apothecary and surgeon, whose name has come down to use through the well-known Fowler's solution. On his second vacation, Withering attended lectures in London, where he came under the influence of William Hunter.

While in school he read papers before the student medical society. Among them was one on dropsy. This is significant in the light of his future experience with foxglove.

He graduated July, 1766. His thesis "Malignant Putrid Sore Throat," which was later elaborated to include his clinical experience with scarlet fever and became one of his important publications, "The Sore Throat of Scarlet Fever." The graduation thesis was dedicated to his uncle, Dr. Brooke Hector, who had served as his preceptor, and to the Reverend Henry Wood, who had given him a sound foundation in the classics.

After graduation he planned a tour of the continent. His traveling companion, a frail well-to-do young man, apparently suffering from tuberculosis, died soon after they reached France, bringing his trip on the continent to an unhappy end. He returned to his home and practiced with his father while casting about for a location. It is said that he considered Chester and Coventry, but finally chose Stafford, where the death of a well-known doctor had created an opening. His decision in favor of Stafford may have been influenced by the fact that

it was nearer his home and that the prestige of his father and medical uncles would follow him there. The newly builty Stafford Infirmary for the poor was ready for patients and Withering was appointed the first attending physician. Stafford was a small town in Staffordshire, which joined his native Shropshire.

Fortunately this country doctor, who had been so indifferent about the study of botany, had to wait for practice. His environment possessed a varied natural appeal. Shropshire was noted for its natural attractions and the prolific growth and flowering of its foxglove. Our own John Burroughs, traveling south from Scotland, devoted paragraphs to the beauties of foxglove, which grew five feet high. The following from his pen should enhance our regard for the plain powdered leaf: "The lower buds open the first week in June and slowly the purple wave creps upward; bell after bell swings to the bee and the moth, till the end of July when you see the stalks waving in the wind with two or three flowers at the top as perfect as those that opened first. I wonder the poets have not mentioned it oftener."

Withering's botanical proclivities were virtually unmoved by the combined influence of John Hope, Richard Pulteney, leisure time, and his wayside environment. It took a bit of romance to fan the spark and sustain the flame. Miss Helena Cooke, an artist with a brush devoted to wild flowers, became one of his first patients. During her illness and her tardy convalescence, his horse spent hours waiting at the roadside while he scoured the surrounding country for rare specimens. This bit of romancing in the spring of 1768, with time to roam the fields, initiated his serious study of botany and aroused his interest in mineralogy. He not only gathered flowers, but herbs, stones and crystals. Intimate contact with the soil, the flowers and trees, stimulated his poetic nature and it is said that he spent much time reading Horace and Tasso. He was fond of poems descriptive of nature and carried a pocket edition of Thompson's "Seasons," which he had indexed for his own convenience. No doubt his interest in climatology, was inspired by Thompson. He was interested in music and dramatics, and participated in the local development of these pleasurable pursuits, thus making his contribution to society and delighting everyone with his amateur acting, his flute and bagpipe.

We have witnessed the evolution of a rare personality, rich in social and cultural graces, an ideal background for the practice of medicine and the gradual development of medical, botanical, mineralogical and climatological research.

In September, 1772, he was married to Helena Cooke, thus preserving the romantic stimulus so essential to his intellectual pursuits.

Withering's five years in Stafford before his marriage were significantly productive, but not financially profitable. Accurate bookkeeping would have shown more for charity than for pay. His professional income had never exceeded one hundred pounds annually. Matrimony caused him to look about for a more profitable location. Three years passed without promise of increased income or a more favorable residence. During this time his reputation was being established through his work at the infirmary and the successful care of his private patients.

Before leaving Stafford Withering's attention was called to foxglove as a household remedy in the treatment of dropsy. He gives the following interesting account of this incident: " In the year 1775 my opinion was asked concerning a family recipe for the cure of dropsy. I was told that it had long been kept a secret by an old woman in Shropshire who had sometimes made cures after the more regular practitioners had failed. I was informed also that the effects produced were violent vomiting and purging; for the diuretic effects seemed to have been overlooked. This medicine was composed of twenty or more different herbs; but it was not very difficult for one conversant in these subjects to perceive that the active herb could be no other than foxglove."

Apparently he lost no time in getting his clinical and experimental investigations under-way. He kept case records and notes on his animal experiments. The turkey was chosen as most suitable for experimental purposes. A decoction of the leaves was first used, then the infusion, and finally the powdered leaves. Nobody knows how long foxglove had been used as a home remedy. George Eliot, in the intriguing story *Silas Marner*, tells how the eccentric peasant recluse, Silas, " brought back Sally Oats's breath " by giving her foxglove and making her " sleep like a baby when her heart had been beating enough to burst her body." Though Silas Marner was published in

1861, the setting of the story was in the latter part of the 18th century. There seems to be no evidence that George Eliot knew about William Withering and his work with foxglove.

In February, 1775, Dr. Erasmus Darwin, grandfather of Charles Darwin, wrote Withering about an opening in Birmingham, caused by the death of Dr. Small, who was medical advisor for Matthew Boulton and his employes at his great factory in Soho, now a suburb of Birmingham. Boulton was among the first " captains of industry," and was considered the father of Birmingham. Also Withering's success in the infirmary at Stafford had attracted the attention of Dr. John Ash, who wanted him to accept an appointment on the staff of the Birmingham General Hospital. Dr. Darwin urged Withering to come because his cultural and philosophical attainments would make it possible for him to successfully fill the vacancy. He also called attention to the fact that the position offered an annual income of five-hundred to six-hundred pounds, without the expense of traveling and " horse-keeping."

Withering moved to Birmingham in 1775. He came as an experienced clinician with sufficient philosophy, poise and confidence to fill Dr. Small's place with a degree of success which later aroused Dr. Darwin's jealousy and animosity. He was succeeded at Stafford by Dr. Fowler, his former guide and host at York.

His marriage resulted in the birth of a son, who died in infancy; a daughter Charlotte, and a son, William, Jr., born in Birmingham, who became his father's biographer.

In a short time his annual income was one-thousand pounds. This was more than his total income during eight years at Stafford. But sudden prosperity could not materially change William Withering, on the contrary, he was grateful for the spare time at Stafford and he now realized the hours he spent in clinical and scientific investigations were not lost, and that the lean years were beginning to pay dividends. Within a year after moving to Birmingham, he published his first book, *A Botanical Arrangement of All the Vegetables Naturally Growing in Great Britain with Descriptions of the Genera and Species According to Linnaeus.* This appeared in two volumes and during his lifetime three editions were printed; one volume was added to each new edition. In addition to twelve copper

plates, it contained an account and a picture of his microscope, designed by him for the study of botany. This was the first scientific treatise on British plants in the English language and it became a popular text on this subject.

In 1776 he developed fever, evidently representing the first obvious symptom of tuberculosis, from which he suffered twenty-three years before it caused his death. Disregarding his physical welfare, he turned from botany to chemistry and mineralogy with untiring energy. We may say his industry was never wholly interrupted by his disease, on the contrary, there were times when physical inactivity seemed to speed the tempo of his intellectual pursuits. He translated the memoir of the Swedish geologist, Bergmann, which dealt with the chemical analysis of waters. This stimulated his interest in the analysis of well-known English waters and led to the first scientific study of the medicinal virtues of Britain's mineral waters. He also studied the solubility of various salts, Peruvian bark and urinary calculi.

About this time he collaborated with John Talbot Dillon in the preparation of a book on *The Natural History and Physical Geography of Spain*. Through his mineralogical researches he discovered native barium carbonate, which, in 1790, was named " Witherite " by the German naturalist Werner. He published papers calling attention to some of his observations in this field. His observations on the angina of scarlet fever were added to his graduation thesis " Malignant Putrid Sore Throat " and published in book form. He considered scarlet fever contagious and implied a knowledge of the germ theory when he suggested " animalcules capable of generating their kind " as a possible cause. His prophylactic measures were in line with modern practice.

It was ten years after Withering first employed foxglove in the treatment of dropsy before he decided to publish what he had learned about it through clinical experience and experimental investigation. In making this decision he was animated, not by a desire to proclaim his knowledge of the drug, this had already traveled far and wide, but by a desire to correct the evil practices which accompanied its use, particularly the tendency toward overdosage. At this time his tuberculosis was progressive and, admitting physical incapacity, he gave

up for a complete rest. He spent several months at Mr. Boulton's quiet country residence. This truce with tuberculosis, leading to physical inactivity, gave time for the preparation of this great work, *An Account of the Foxglove and Some of its Medical Uses*, which was published in 1785. Again he was drawing on his country experience and capitalizing the lean years.

Beginning the investigation of the Shropshire grand-dame's concoction of twenty herbs, he had isolated the foxglove as the potent agent, he had employed it in practice and confirmed his conclusions by animal experimentation. Now, when leisure offered the opportunity, he was ready to record the action and use of digitalis so minutely and so accurately that the accumulated experience of one-hundred sixty years leaves the record unchanged. His masterly discussion of effects, rules, cautions and inferences stand as our guide today. Not only did this 207 page work, including the citation of 163 cases, slip from his pen during this short period set apart for rest, but he wrote "Experiments and Observations on the Terra Ponderosa," translated Bergmann's "Mineral Kingdom" under the English title "Outlines of Mineralogy," and edited the second edition of his own work on botany.

After a few months he returned to practice but the following year brought another break, which sent him to the country for recuperation. In 1789 he was made a Fellow in the Linnaean Society, but was prevented from taking part by an attack of pleurisy. In 1790 he had another severe attack of pleurisy, followed by the persistent manifestations of advanced pulmonary tuberculosis, including hemoptysis and progressive weakness. For years the English winters rested heavily upon his chest and ultimately drove him to Portugal, where he spent the winters of 1792 and 1793. Here he found it difficult to rest. How could a skilled botanist and mineralogist calmly rest in the midst of tropical flora and well-known mineral waters calling for analysis? He made a number of botanical excursions and analyzed the waters of the famous hot springs at Caldas. In recognition of the latter he was made an honorary member of the Royal Academy of Portugal.

The second winter in Portugal was disappointing. He not only failed to improve, but had a severe hemorrhage. On his return to

England he landed at Falmouth and leisurely scanned the coast from Lands End to the Isle of Wight. He visited Stonehenge and could not refrain from viewing it with the eye of an mineralogist. In fact, the entire trip intended for rest and relaxation was devoted to the study of medicine, botany, mineralogy and climatology.

On this trip he visited Cornwall and inspected the tin mines, and at Covey to study anthracite deposits, showing how successive forests had been submerged and converted into coal. Naturally this journey, following the unsuccessful winter in Portugal, caused him to give more attention to tuberculosis.

After his return to Birmingham, Withering continued his work for approximately three years. The third edition of his botany had drawn heavily upon his remaining strength, but he became reconciled to the bed only when he could no longer remain on his feet because of progressive prostration, repeated hemorrhages and shortness of breath. Most of his writing was done while he was reclining. Conscious of the fact that residing in the great house of Edgbaston, where he had lived happily with his hobbies, required too much effort and was otherwise unfavorable, he moved to the quiet home of his former friend, Joseph Priestley. This was rebuilt to meet his needs and named by him " The Larchs."

Considering the short time he had to live, the move was unfortunate, but Withering's genius, apparently unmindful of approaching death, spurned the call of common clay and pressed on toward his goal of ultimate intellectual achievement. Though constantly occupied with his books and the fresh specimens in his ever-expanding herbarium, he maintained the spirit of the true physician by seeing a few patients who came to his bedside for consultation. With the last atom of physical energy, he wrote therapeutic instructions for an English peer who had come for advice and treatment.

After seeing Withering on his death bed, one of his friends unintentionally made this pathetic but appropriate pun: " The flower of English physicians is indeed Withering."

On October 6, 1799, at the age of fifty-eight, William Withering died of the wasting disease with which he had so valiantly contended during the latter half of his active life.

Soon after locating in Birmingham Withering became a member

of the Lunar Society. Among the members were Dr. Erasmus Darwin, Matthew Boulton, James Watt, Josiah Wedgwood, Joseph Priestley and John Baskerville. In addition to contact with these distinguished fellow-members, he met many noteworthy guests of the society and received a continuous stream of distinguished visitors at Edgbaston, thus enlarging his knowledge of world affairs and broadening the field of his influence.

Though never well after he moved to Birmingham, he developed the largest practice outside of London. His annual income reached 2,000 pounds. It is said that in 1785 he traveled over 6,000 miles, visiting his patients. He had a lamp in his carriage so he could study plants and minerals and make notes between calls. Once his carriage turned over, resulting in a fracture of his collarbone. Withering was a popular consultant and in addition he received many letters seeking medical advice. Among these was a request from Benjamin Franklin, then in Paris, for treatment of stone in the bladder. This request must have yielded satisfactory results, since Dr. Swediar later wrote to Withering inquiring about the remedy he gave "Benjamin Franklin for the stone."

Withering's correspondence was voluminous and much of it had to do with scientific discussions. A short time before his death Sir William Osler accepted an invitation to address the British Botanical Society. He chose as his subject "Notes on the Life and Correspondence of William Withering." Unfortunately, Sir William's death interrupted the preparation of this address. On the 24th of August, 1918, Dr. Osler wrote Joseph H. Pratt: "Did you know that I made a great haul of Withering's letters, etc.? A man came in one day with a bag and said—are you interested in W? I said '*rather*' and he pulled out a big bundle of letters and papers and his Edin. diploma. I offered him 20 pounds, at which he nearly expired, as he had hoped for not more than 5 pounds. I should have gone to double at auction. I have them all in chron. order and beautifully bound. He was a great man."

Among the "scraps of writing" which Osler kept at his bedside during his last days, one was devoted to the disposal of certain books. Item Number 5 read as follows: "To the Royal Society of Medicine—Withering's letters, papers and diploma 1762-1793 (1764-99).

And I hope that some member of the Historical section will (*sic*) edit them carefully." Sir William Hale-White edited these papers and called attention to the fact that there seemed to be some confusion as to how they came into his possession. The following is from Sir William Hale-White's discussion in the *Proceedings of The Royal Society of Medicine*: "Dr. W. W. Francis has written to me to say that it is clear that Osler's memory was at fault, for he bought this collection of Withering's letters for 20 pounds by correspondence from a well-known antiquarian bookseller, who wrote a letter to Dr. Francis giving an account of the transaction. This letter, thanks to Dr. Francis, I have seen. Dr. Francis tells me that it was some other papers that Osler bought from the bagman."

His interest in tuberculosis led him to observe and record occupational influences in terms which have been confirmed by modern studies. He believed tuberculosis to be infectious and while deprecating the practice of sending patients to far away climates, he considered the Isle of Wight a favorable resort. In a letter to Thomas Beddoes he gave his views on tuberculosis, which, when published, constituted a valuable contribution to the subject. He observed classical symptoms of pulmonary tuberculosis in his pet monkeys, typifying tuberculosis in man. He followed them to autopsy in order to confirm his observations.

In addition to his monumental work on foxglove and his scientific investigations and publications in other fields, it may be said that he anticipated Pasteur, when, in connection with his study of scarlet fever, he suggested the possibility of causative "animalcules capable of generating their kind" and he was 150 years ahead of Yandell Henderson and his co-workers in the use of carbonic acid gas with oxygen in the treatment of asphyxiation. In the treatment of asthma, he advised sleeping in large curtainless beds, the removal of feather beds and pillows and temperance in all things, no doubt including diet. Also a sea voyage or change of residence in obstinate cases, thus suggesting a suspicion of local exciting agents.

In connection with his hobby for Newfoundland dogs, he studied hydrophobia and outlined management which has not been improved upon except through Pasteur's prophylactic serum. Not only did he discuss climatic conditions throughout the world, but he tried to

create an ideal atmosphere by pioneer efforts at air conditioning in his home at Edgbaston. He employed double sashes, improvised flues and an ingenious attempt to maintain a temperature of 65 degrees Fahrenheit. It is interesting to note that this approaches the ideal of 68½ degrees established by the New York State Commission on Heating and Ventilation.

Erasmus Darwin added an appendix to his deceased son's graduation thesis published 1780, in which he reported the use of foxglove in several cases. In 1785, under the title "An Account of the Successful use of Foxglove, in Some Dropsies, and in the Pulmonary Consumption," he reported a larger number of cases. Though we must grant priority of publication to Darwin, it should be noted that Withering first called his attention to the use of foxglove when he saw Miss Hill in consultation with Darwin in July, 1776. In Darwin's first account of foxglove, this is listed as case report No. 1. In Withering's book it is Case No. 4. The latter's detailed report indicates that the patient had not improved after a fair trial of the usual remedies and on this account Withering modestly suggested the use of a concoction of foxglove; which was courteously accepted. The results were striking and there is convincing evidence that this was Darwin's first experience with foxglove. Curiously enough he failed to divulge the original source of his knowledge and consequently did not give Withering credit for having called it to his attention. Dr. John F. Fulton, who has given much thought and study to this question, says: "If one applies modern standards of ethics, one must conclude that the grandfather of the celebrated naturalist was somewhat unscrupulous. If priority of publication means anything in these circumstances, he indeed has a legitimate claim over Withering. However, one must recognize that it was Withering, not Darwin, who convinced his medical contemporaries, and it was he who inaugurated the systematic use of the drug; he kept full records of his results, and published after an interval of ten years of careful observation, a full and systematic treatise on its action."

Briefly we have considered the life of a versatile, sensitive, highly educated, popular physician, in whose mind scientific precision mingled with refined tastes and ethical instincts. Though William

Withering exacted much from his environment, he gave much in return.

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HENRY LEBER COIT: A BIOGRAPHICAL SKETCH

MILDRED V. NAYLOR

" Tommy, here's your milk."

That children today have such good, pure, safe milk to drink is due in great part to Dr. Henry Leber Coit, the originator of certified milk. He was called the " Father of Clean Milk " and the " Apostle of Certified Milk," and he well deserved these names. From the time he began to practice medicine he was distressed by the number of seemingly avoidable deaths among young children, but it was not until he had to stand by helplessly and watch his own young son die during a milk-borne diphtheria epidemic in 1888 that he resolved to wipe out such epidemics if it was humanly possible.

The story of how Dr. Coit obtained certified milk has been told more than once, but the story of service as great and important to humanity as his cannot be told too often.

He was the son of a Methodist minister. He was born in Peapack, New Jersey, in 1854, where his childhood was spent. His father died when he was but twelve years of age, and he and his mother moved to Newark. To help take care of his mother he obtained a position in a drug store. The work was hard for a young boy and many nights he slept under the counter in the store. Later he took a position in a New York drug store and went to live with his grandfather. He kept a personal account book mainly of money received, and recording the weather, all in beautiful writing and hand decorated with sprays of flowers and scrolls. He had a particular gift for this and used it all his life to embellish letters and presents given to friends.

During the years he worked in the drug store he even earned a little extra money by decorating cards. Half of his money he sent to his mother probably to help pay for his clothes, and he noted receiving a pair of shoes, or socks, ties or a suit. He looked forward with pleasure to spending a Sunday in Newark with his mother for these visits are jotted down in his diary. He seemed to worry a great deal about his behavior for he frequently wrote at the end of a page:—" God help me to be a good boy."

He took a great interest in his job and often noted the condition of business; one entry, for instance, reads, " Very busy in the store today, took in $85.00." He suggested that the proprietor put in a soda fountain. Few drug stores had such conveniences then, and it was highly successful.

Dr. Coit often told the story of how he decided to become a physician. He was present one time at the scene of an accident and he fainted when he saw the blood. A man standing by made the remark, " You would never make a doctor." From that moment he decided to be one.

His studying had to be done in his spare time, but he saved his money and was able to go to the College of Pharmacy in New York from which he graduated with honors. Similarly, by working as a chemist with Tarrant and Company, and an instructor in the College of Pharmacy, he worked his way through the College of Physicians and Surgeons, graduating in 1883.

He interned in one of the Newark hospitals. One night a woman was brought in with a ruptured ectopic pregnancy. There was no doctor in the hospital, and Coit phoned all over the city for a staff physician with no result. He realized the woman would die if she were not operated upon immediately, and contrary to hospital rules he performed the operation. Even though he saved the women's life, he aroused the disapproval of the profession, so that when he set up practice in Newark in 1884, he had a difficult time. He was poor and he did much free work with patients unable to pay.

He did not long remain poor. He started out as a general practitioner but very soon his interests were centered on children and he limited his practice to pediatrics. Parents were glad to take their children to him because he had a real interest and love for children. He wanted them to have a good start in life, and above all, he wanted them to live to have that start.

While his own son lay dying, Dr. Coit sought desperately for some clean milk for him to drink. Milk was carried on carts in forty quart cans and was measured in the quantities desired into any convenient container the busy housewife could find when the milk wagon arrived. One moment the driver of the cart would be handling the

reins, or his horse; the next, the same unwashed hands were slopping around with the milk that the family would later drink.

Observing this custom Coit decided something should be done. He spent five years travelling in a buggy over the surrounding countryside in his spare time, visiting farms and farmers, discussing dairymen's problems and investigating ways of solving them. He made notes which were the basis of the rules and regulations he eventually drew up for certified dairies. Finding it was useless to appeal to the legislature, since there were enough laws already made to ensure clean milk if the laws were strictly enforced, he decided the best way to handle the situation would be through an unpaid medical milk commission composed of doctors who would make regular visits to the dairies "to establish correct clinical standards of purity for cow's milk;" make "periodic and personal inspection of the dairies" and "provide for bi-monthly expert examinations of the dairy stock by a competent and approved veterinarian." On December 5, 1892, he read his historic paper before the Practitioners' Club, the largest and most powerful medical association in Newark at that time. In it he outlined his plan for a certified milk supply and submitted a proposed agreement to be made between medical milk commissions and dairymen. The plan was enthusiastically received and it was voted to appoint a commission. It was necessary to have this commission approved by the legislature. Dr. Coit and other Essex County doctors spent days in Trenton trying to get a hearing. Even in those days the milk dealers were fairly well organized and they sensed that a milk commission would hamper them and force them to make expensive changes which they felt unnecessary and absurd. Finally one morning at a meeting of the legislature, some one said, "Here is a commission which asks to be appointed and they want no salaries!" Thus was the medical milk commission approved.

The next step was to find a dairyman willing to comply with the commission's wishes. Fortunate were they to discover Stephen Francisco, a dairyman in Fairfield, and he was of invaluable aid to Dr. Coit. He was soon enthusiastic about Coit's beliefs, and was willing to cooperate. The changes in methods involved a lot of expense, and Francisco could not be sure that the returns would cover

these expenses. J. Frank Kitchell, now president of the board of the Coit Memorial Hospital, and the only surviving member of the original board, with several other men, agreed to underwrite Francisco's Fairfield Dairy for three years. The experiment proved so successful that they never had to pay out one penny.

It will not be out of place to say a few words here about Stephen Francisco, for his name is linked inseparably with that of Dr. Coit. To their generous labors and continuous efforts are due the development and success of the certified milk movement. It would have been hard to find any man who would have fitted better in Coit's plans and beliefs. Francisco, too, was a staunch Methodist; honest, hard-headed, straight-thinking. His life was fruitful and full of fine purpose. He ran his dairy scientifically and successfully until his death on March 29, 1923, when the dairy management was taken over by his daughter, Miss Ruth Francisco, who carried on until March 31, 1928, when, because of the physical inability of Miss Francisco to carry on, the Fairfield Dairy closed its doors. As on the first day, the last bottle of milk produced was tied with a blue ribbon and delivered to Mrs. Henry L. Coit, whose loyal help and wise counsel contributed much to her husband's success.

Mr. Francisco was the first dairyman to put milk in bottles. Visitors to his dairy included physicians, public officials, representatives of scientific societies, sanitarians and dairymen from all parts of the world.

On May 19, 1893, an agreement was drawn up between Stephen Francisco, Dairyman, and the Medical Milk Commission of Essex County. It took up in detail the location of lands, buildings, the water supply, surroundings, conditions of the dairy stock, housing and care, feeding, collection and handling of the milk, preparation for shipment of the milk, bottling and transportation and shipping. The first bottle of certified milk was delivered to Dr. Coit that same afternoon tied with a blue ribbon. He gave the first glass to his two year old daughter.

The name " Certified Milk " was coined by Dr. Coit. It is a raw milk taken from tuberculin tested cows, immediately chilled and bottled, not changed by any process and produced only under the supervision of medical milk commissions. Because unscrupulous

dairymen copied the term it was found advisable to have it copyrighted. It was registered as a Trade Mark by Stephen Francisco and held in trust by him for the Essex County Medical Milk Commission with the understanding that the use of the term could be extended to other medical milk commissions. The movement spread rapidly in this country, Canada and abroad and now there are at least eighty medical milk commissions. Coit planned so thoroughly and well that the original seventy rules laid down by him are still adequate and, in essentials, unchanged. In 1909 he was the means of procuring the enactment of a New Jersey State law defining the term "certified milk."

The first tuberculin test was made in America in 1892 by Dr. Leonard Pearson, Professor of Veterinary Medicine at the University of Pennsylvania on 79 cattle of which 21 reacted. The first test in New Jersey was made by Dr. Werner Runge in the summer of 1894 at Fairfield, on the Fairfield Dairy certified herd for the Essex County Medical Milk Commission.

Meetings of the commission were held regularly. Coit would arrive with a sheaf of papers full of details to discuss. No smallest thing was too insignificant for his attention. Sterile containers, healthy cows, good fodder, clean and suitable bedding, stalls thoroughly cleaned daily, proper housing, clean hands for the milkers, regularly inspected workingmen, clean udders, clean pails. One whole winter was spent in solving the problem of the best type of pail to use. At one time there was a sudden rise in the bacterial count. A thorough investigation was made. It was discovered that a new and zealous workman was having the stalls swept out just before the cows were brought in for milking. The ensuing dust gradually settled in the pails of milk as it was being taken from the cows. One entire evening was given over to the discussion as to what to do with the cow's tail during milking. It was a moot question whether to attach it to one leg or to the other, or tie it up with a ribbon as they did it in Holland. Stephen Francisco would often bring samples of milk to these meetings, but it was not touched until all of Coit's details were settled. After certified milk was introduced the death rate, where it was used exclusively, declined immediately.

Dr. Coit's second great achievement was the founding of the

Babies' Hospital, now called the Coit Memorial, the second of its kind in the United States. This, too, can be directly traced to his son's death. He felt a general hospital was not properly equipped to taken care of children, nor did it give the individual treatment which children needed. Coit had the happy faculty of inspiring people; he was a born leader and organizer. He could get money from people for any project he started. In May 1896 he presented the project of a babies' hospital to Mr. J. Frank Kitchell and Mr. John Remer. They enthusiastically endorsed the idea and asked twelve men to join them. Frederick Frelinghuysen, brother of Senator Joseph Frelinghuysen, became interested, and he formed a group of men who contributed generously toward a sum of money for the hospital. A double house at the corner of High and Bank streets was purchased. One half of the house was fixed up for the hospital; the other half was rented to bachelors, so that bachelors helped to pay for the babies' welfare.

Money wasn't spared in fixing up the hospital; it was painted throughout in white enamel. Everything was spotlessly clean; every piece of woodwork in the hospital was washed with a wet and a dry cloth every day. Nurses were given special instruction and if by chance one forgot and kissed a baby she was sternly reprimanded. On the other hand, Dr. Coit knew the value of a mother's care, and the nurses were taught to give each baby a certain amount of proper handling each day. Many of the wealthiest people in Newark became interested in the hospital, so much so that at one time it was considered a social triumph to be connected with the auxiliary of the hospital. They were called the "400" of Newark society. Coit always took great pleasure in giving each nurse on the staff a box of candy at Christmas. He would go to a wholesaler's and buy the boxes, then he would buy the candy in quantity and make up each box himself. He even went to the trouble of fitting each box to the personality of the recipient.

Dr. Elmer G. Wherry, a life-long associate of Dr. Coit's, and now director of the Babies' Hospital, tells the story of how he came to be appointed to the staff. After graduation he had a hard time getting a hospital appointment. One day he heard there was to be an opening at the Babies' and he went to apply. There were several other young

men there with the same idea, all with good qualifications. It came Dr. Wherry's turn. Dr. Coit talked to him, asked him if he had had any special training for children's work, or had ever done any. Wherry had to admit he had had only the ordinary instruction given in school. He received the appointment. A little dazedly Wherry asked Dr. Coit why he would have been chosen when there were so many ahead of him seemingly better qualified. Coit said:—"That's just the trouble, they know too much. I want someone I can teach."

In connection with the Babies' Hospital the baby Keep Well stations were opened up in different parts of the city. Here a mother could take her baby to have it weighed, thoroughly examined, its formula changed or get advice as to the best way to keep her baby well. Dr. Coit's idea was that well babies should not be brought into contact with sick ones, and yet during their second year of life, particularly after the baby was taken off breast milk, a certain amount of medical attention was beneficial to a baby's welfare. The Keep Well stations were the answer to this problem; sick babies were taken to the hospital clinic.

He had many ways considered peculiar at that time. The story is told of a doctor who took his child to Coit for treatment. The child had a penny grasped in her hand. Dr. Coit abruptly took the penny from the child and washed it thoroughly at the sink. "Don't ever give anything dirty like that to a child," he said. When people took scrawny babies to him he'd say he could easily fatten them, but fat was not important if bodily strength was not added with the fat.

He was particularly fussy about the health of his family. So thoroughly did he train his own children in cleanliness that the ordinary child's indifference to dirt was impossible to them. To pick up a dropped piece of candy and pop it into the mouth? Unthinkable! He was so passionately fond of his son and so concerned for his health that he made him drink a glass of milk at every meal until he was eleven years old. This was an unusual thing in those days, and his son felt ashamed in front of his playmates. Milk was for babies! Dr. Coit did not trust himself in the care of his own children, and whenever they were sick he would call in another physician. For this reason his son thought his father wasn't a good doctor—another reason for shame!

The parents of his patients, however, believed in him implicitly. He wasn't afraid to take chances. One day a baby was brought into the hospital with paroxysms, and likely to die in a half hour's time. The doctors stood around thinking what to do. Coit took the mother aside and told her there was one chance in a hundred of saving her child, if she was willing to have him take that chance. The mother said, " Doctor he is in your hands." Coit had a cake of ice brought up and broken into small pieces and put in a bath tub. On this bed of ice he laid the baby and covered it to its neck with cracked ice and left him there for half an hour. The baby lived and in two weeks was sent home completely well.

He could be dictatorial when necessary. A woman once brought to him a baby she was nursing. When the doctor discovered she was drinking beer to make the milk stronger for her baby he was very angry and told the woman not to touch another drop. Many foreign born mothers not only drank beer but gave it to their young children to drink at that time, and still do. Dr. Coit's abhorrence was probably twofold since he was a very abstemious man. He never smoked in his life, and tasted " strong drink " but once. This was in Austria. He was standing on a platform one cold rainy day waiting for a train. He was so chilled he thought a glass of beer might warm him and for this reason drank his first and only taste.

That his patients were grateful was proven more than once. He treated the daughter of a man in Richmond, Virginia. The doctor in charge of the child asked Coit to go and he reluctantly gave up the time to do so. He pulled the child through and in gratitude the father begged Coit to spend some time with him at his country home on the Hudson. Coit couldn't spare the time. One morning his attention was called to the curb in front of his home. There stood a beautiful new car which the Richmond man had sent because Coit's bill was not large enough and he wanted to make the payment adequate.

One of Coit's greatest assets was his ability to look into the future and see what would be needed. At the time of the biggest infantile paralysis epidemic in 1916, even during the worst of the crisis, Coit realized that all those afflicted would need a great deal of after care. He collected thousands of dollars and organized a group of people

known as the Citizen's Relief Committee. With the money collected he brought an instructor from Boston who gave eight nurses instruction in massage and muscle training, so that when the epidemic had waned, the necessary "after care" was organized and ready for operation.

He was fond of alliteration in writing and he would make notes on any scrap of paper. He was one of the few remaining men in Newark to wear side burns. He never quite had time for all he intended to do, and was notoriously late in keeping appointments. He had a good sense of humor, loved stories and always had one to tell. He often told the story of his second honeymoon taken about ten years after his marriage. He decided to go to one of the large hotels in Lakewood, New Jersey. After he and his wife were settled in their room they noticed a sign on the door which stated that the price of the room was ten dollars a day. Realizing how much money this would mean for the length of time he had planned to stay, he decided to leave the next day. When he reported at the desk that he was called home and asked for his bill the clerk said: "Oh, there is no bill, we were giving you the use of the room for as long as you cared to stay!"

He had the faculty of putting people at their ease and making them laugh. Possibly his only recreation was fishing. His great joy was to go fishing in Maine with the father of one of his patients. He liked to attend medical meetings and conventions. Four times he went to Europe as the delegate to medical congresses. He was president of the Essex County Medical Milk Commission, twice president of the American Association of Medical Milk Commissions, and vice-president of the International Society of Goutte de Lait. He was collaborating editor of the Archives of Pediatrics.

He died in 1917 of pneumonia after an illness lasting only forty-eight hours. He spent the afternoon before he died dictating to two stenographers, from his bed. He had work he had to finish before he died.

At the first meeting of the Practitioners' Club after Dr. Coit's death, the President asked everyone to stand while Dr. Wherry said a few words of tribute. These impromptu words from a full heart give a picture of the man that will bear repeating. Dr. Wherry said:

" It is impossible to tell in a few words, or in many words, my appreciation of Dr. Coit. It cannot be expressed by saying that he was a good man, nor by saying that he was a great man, He *was* both good and great. He was gentle, kind and strong. He was indomitable and exacting, yet patient and considerate. He had great will power, steadfastness of purpose and perseverance. Though he took pride in his ancestry, his family, and in his accomplishments, he was yet humble and modest; though an aristocrat, he was democratic in his feelings and associations. He was both a visionary and a doer of deeds. He saw visions and dreamed dreams, and after long years of persistent and patient effort his visions are realities, his dreams have come true. He worked alone to accomplish his great tasks. He had a large brain and a big heart.

" His memory is an inspiration. His good deeds are an example. His humanitarian and altruistic spirit still lives. His influence is immortal. He has left us a perpetual heritage."

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Dr. Elmer G. Wherry, Mr. J. Frank Kitchell, Miss Edith N. Coit, daughter of Dr. Coit, Dr. James H. Lowrey, and Miss Florence Burns, Director of the Somerset Hospital, Somerville, New Jersey, have contributed personal stories and anecdotes which I gratefully acknowledge.

THE GREAT WINDMILL STREET SCHOOL

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Although the doors of Great Windmill Street School of London were closed over a century ago, the influence of this school founded by William Hunter has been transmitted to later generations by those who caught the contagion of its spirit. The very name of Great Windmill Street awakens in the mind of surgeon and anatomist alike a feeling of gratitude for the contributions to improved methods of teaching which came from this Hunterian school. The surgeon-anatomists [1] affiliated with it continued the work of its founder. The roster of their names is an illustrious one. Great Windmill Street School was indeed " the nursery, for three-quarters of a century, of great anatomical teachers." [2]

The seed from which Great Windmill Street School developed really started its germination in a series of lectures on anatomy given by William Hunter (1718-83) in 1746.[3] Hunter, as a young man in Scotland, had come under the influence of William Cullen [4] (1712-90) and Alexander Monro primus [5] (1697-1767); in London he had been associated with William Smellie [6] (1697-1763), Frank Nichols [7] (1699-1778), James Douglas [8] (1675-1742) and James Wilkie [9] (?-1750). For several years he prepared and collected

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[2] Gross, S. D.: John Hunter and His Pupils, Philadelphia, Blakiston, 1881, p. 78.

[3] Peachey, G. C.: A Memoir of William and John Hunter, Plymouth, William Brendon and Son, Ltd., 1924, p. 80.

[4] Ottley, Drewry: The Life of John Hunter (In the works of John Hunter edited by James F. Palmer.) London, Longman, 1835, vol. 1, p. 3.

[5] Fox, R. Hingston: William Hunter, London, H. K. Lewis, 1901, p. 4.

[6] Fox, R. Hingston: *L. c.*, p. 4.

[7] Munk, William: Roll of the Royal College of Physicians of London, London, Published by the College, 1878, vol. 2, pp. 123-126.

[8] Graham, Harvey: The Story of Surgery, New York, Doubleday, Doran and Co., Inc., 1939, p. 230.

[9] Beekman, Fenwick: The Rise of British Surgery in the Eighteenth Century, *Ann. M. Hist.*, n. s., 9: 560, 1937.

specimens and studied to fit himself as a teacher of anatomy. He spent a winter in Paris and became familiar with the French method of dissection.[10] In a letter, which he wrote to Cullen in May, 1746 he mentioned that among his many duties he was working especially "at a most compendious system of anatomy and physiology, which will be necessary to be before me in the winter, should I at last enter upon my old scheme." [11]

William Hunter began his career of teaching at an opportune time.[12] The separation of the Barbers from the Surgeons on May 2, 1745 allowed for the establishment of a private school of anatomy with an opportunity for dissection by the student. The United Company of Barbers and Surgeons (which had been in existence since 1540) had held the monopoly of teaching anatomy and surgery. No member of the corporation was permitted to give courses in dissection in his private rooms. William Cheselden (1688-1752), outstanding figure of English surgery during the first half of the eighteenth century, had been called before the Court of Assistants of the Company of Barbers and Surgeons because he had procured bodies of malefactors and dissected them at his own house.[13] When the company was dissolved, the ruling against private courses in dissection was abolished. This circumstance permitted the rise of private schools.

It is significant that William Hunter brought into British medical schools the Paris method of dissection. By this method each student was provided with one entire body and the lecturer himself frequently inspected the dissections. The opportunity for the students to dissect with their own hands was a decided advancement in the teaching of anatomy in the schools of London.[14]

John Hunter [15] (1728-93) joined his brother in 1748 and became

[10] Beekman, Fenwick: *L. c.*, p. 556.

[11] Thomson, John: An Account of the Life, Lectures and Writings of William Cullen, M. D., Edinburgh and London, W. Blackwood and Sons, 1859, vol. 1, pp. 22-23.

[12] Packard, Francis R.: William Cheselden: Some of His Contemporaries and Their American Pupils, *Ann. Med. Hist.*, n. s., 9: 548, 1937.

[13] Power, D'Arcy: The Rise and Fall of the Private Medical Schools in London, *Brit. Med. Jour.*, vol. 1, p. 1388, 1895.

[14] Peachey, G. C.: *L. c.*, p. 98.

[15] Owen, Edmund: John Hunter and His Museum (The Hunterian Oration), *Lancet*, vol. 1, p. 417, 1911.

associated with him in his teaching and research. William Hunter continued his classes at various places during the ensuing years.[16] Courses were given at the Little Piazza, the Great Piazza, the Chelsea China Warehouse in Picadilly and at Litchfield Street. He resided at Jermyn Street from 1756 until 1768 but Peachey says that this house was not used for lectures by William Hunter.

The plan of establishing a national school of anatomy in England which would include an anatomical museum was always present in Hunter's mind. To this end he collected normal and pathological specimens and gradually enlarged his collection to include biological and anthropological specimens as well. He presented a Memorial to Lord Bute, First Lord of the Treasury, in which he asked for a grant of land on which to erect a building.[17] He offered to expend six or seven thousand pounds of his own money and to give his museum and his labor. This offer was probably made in March, 1763.[18] Lord Bute resigned on April 8, 1763 and the Memorial was recommended by him to Mr. George Grenville, his successor. Caesar Hawkins presented a strong petition [19] to the king in behalf of William Hunter's project. He declared that anatomy required and deserved a public school under the Crown's protection and believed that under Mr. Hunter's guidance the project he had proposed would " hardly fail of success."

The Surveyor-General, in January, 1764, supplied an account [20] of several parcels of land in Westminister in His Majesty's disposal, " one of which may probably be thought proper for carrying the Doctor's scheme into execution." Hunter submitted a plan [21] of the buildings which would cover a piece of ground " 112 feet in front by 71 feet in depth." He waited long for the reply to his request but it never came.[22] He was bitterly disappointed. Afterwards, the Earl of Shelburne offered to head a subscription list with 1000 guineas

[16] Peachey, G. C.: *L. c.*, p. 112.
[17] Hunter, William: Two Introductory Lectures, London, 1784, pp. 120-121.
[18] Peachey, G. C.: *L. c.*, p. 119.
[19] Hunter, William: *L. c.*, p. 127.
[20] Hunter, William: *L. c.*, p. 120 et seq.
[21] Hunter, William: *L. c.*, p. 120 et seq.
[22] Brodie, Benjamin: Autobiography (With the Works of Sir Benjamin Collins Brodie, collected and arranged by Charles Hawkins). London, Longman, 1865, vol. 1, p. 449.

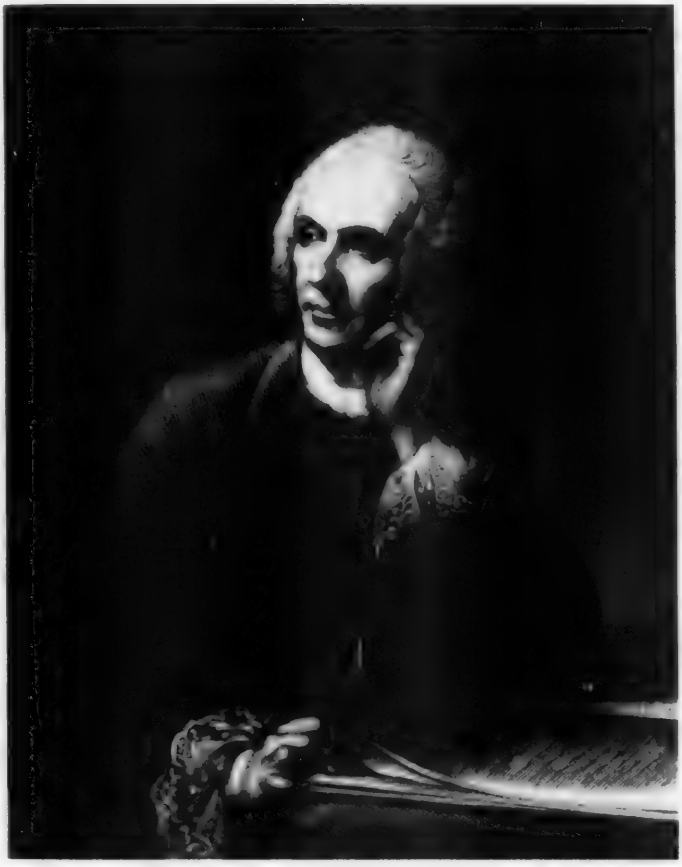
so that Hunter's plan might come to fruition. Simmons states that "Dr. Hunter's delicacy would not allow him to adopt this proposal." [23]

His original purpose was still in his mind although his original plans were thwarted. He determined to rely upon his own efforts and bought [24] a piece of ground in Great Windmill Street near Picadilly in 1766. Alterations and additions, the accompaniment of rebuilding, occupied the next year. He wrote [25] Cullen in 1768 that he had already paid £6000 for his place in Windmill Street and that it would cost him £2000 more at least. He stated in this letter that he planned to occupy the premises in June, 1768. The building contained "a handsome amphitheatre and convenient apartments for his lectures and dissections." It had "one magnificent room fitted up with great elegance and propriety as a museum." [26] The theatre was constructed well both for seeing and hearing. A sky-light was over the demonstration table. The seats were close to the table and arranged in tiers.[27]

His museum was not only of large size but was of great value.[28] He had spent many years in gathering his material. For £200 he had purchased the collection of Francis Sandys, a professor of anatomy at Cambridge. Many of the excellent preparations of William Hewson were in the collection. He bought the specimens collected by Magnus Falconar, a brother-in-law of Hewson, in 1778 for £900. He added Andrew Blackall's preparations in 1780. Others were procured at different times. Medical friends and students sent him specimens of rare diseases. Hunter called such gifts "a present to the public."

But Great Windmill Street School did not become an outstanding school of anatomy just because it had a spacious building and an unexcelled museum. Garfield's remark [29] concerning Mark Hopkins on one end of a bench and a student on the other could have been made of William Hunter as well.

[23] Simmons, Samuel F.: An Account of the Life and Writings of the Late William Hunter, M. D., London, Richardson, 1783, p. 56.
[24] Munk, William: *L. c.*, vol. 2, pp. 209-10.
[25] Thomson, John: *L. c.*, vol. 1, p. 554.
[26] Simmons, S. F.: *L. c.*, p. 57.
[27] Hunter, William: *L. c.*, p. 111.
[28] Simmons, S. F.: *L. c.*, pp. 57-58.
[29] Garfield, James: Address to Williams College Alumni, N. Y. (December 28, 1871).



William Hunter.

Fig. 1.

William Hunter, Founder of Great Windmill Street School.
(From Pettigrew's "Medical Portrait Gallery.")

William Hunter truly had a passion for teaching. He was of the opinion that a man could do far more for the public by teaching his art than by practicing it. Only the few individuals for whom he could care benefited from the practice, but " the influence of a teacher extends itself to the whole nation and descends to posterity." [30] Even when he was a wealthy man he continued to teach. He was wont to remark that he wished no profit from his lectures and was satisfied if they paid their own expenses.[31]

Simmons felt [32] that Hunter deserved his celebrated reputation as a teacher. He was a good speaker and " his dialect had all the polish of the southern metropolis, with enough of the northern recitative to preserve the close of his sentences from too abrupt a cadence." [33] He could make even the most complicated subjects clear and understandable. He frequently illustrated some anatomical fact by citing some case which he had seen. Hunter possessed an interesting fund of anecdotes. " The extent of his knowledge enabled him to throw a charm of interest over the dry details of descriptive anatomy." [34] His enthusiasm for his subject was infective and he was able to instill some of his zeal into his students. He made teaching the pleasure and the ambition of his life. Is it any wonder that Great Windmill Street School became a nursery for teachers of anatomy?

His " Introductory Lectures " at Great Windmill Street School show his interest in his students and his sincere desire that they profit from his course.[35] He was very anxious that the student should not be absent from any lectures lest he should lose the continuity of the matter presented and not profit by the demonstrations. Beginners were dissuaded against taking notes but urged to try and understand. Hunter strongly approved of students in the second course taking notes, and even suggested that such short items be expanded at leisure while yet fresh in the memory.

[30] Hunter, William: *L. c.*, pp. 120-121.
[31] Brodie, Benjamin: *L. c.*, vol. 1, p. 446.
[32] Simmons, S. F.: *L. c.*, p. 11.
[33] Adams, Joseph: Memoirs of the Life and Doctrines of the late John Hunter, Esq., London, 1817, pp. 19-20.
[34] Chambers, Robert: Biographical Dictionary of Eminent Scotsmen, London, Blackie and Son, 1864, vol. 3, p. 155.
[35] Hunter, William: *L. c.*, p. 103.

He requested that the students refrain from discussing the work of the course with the populace " especially with respect to dead bodies." [36] Strangers and the morbidly curious were not to be admitted to the school. Any student who brought a friend had to present him to the lecturer just prior to the lecture. No visitor, however, was admitted to the lectures upon the organs of generation and the gravid uterus. " The reasons for such exceptions must be obvious." [37]

He gave very explicit directions as to the manner in which preparations were to be passed around the class. Each student was to point out the part to be examined to his neighbor and that alone was to be looked at. " No experiment is to be made, by pressing or bending, to try their strength or texture." [38]

Hunter recognized [39] that some men came to the classes just " to go through a prescribed form of education " and not for the desire of obtaining knowledge. " From such nothing is expected," he told his class, and he insisted that such men refrain from disturbing those who wished to learn.

Stress was placed upon the value of the demonstrations [40] which preceded the student's dissection. He realized that to study as many dissections as possible and to see " the principal parts dissected over and over again " made for proficiency in anatomy. He suggested that his students make and collect for themselves as many anatomical preparations as possible.

Hunter began his lectures [41] with a discussion of the history of anatomy, its uses, and the best methods of study. After these preliminary remarks he entered into an explanation of the " nature and use of the similar and constituent parts of the body " so that students should have a general understanding of the subject. " Blood, arteries, veins, lymphatics or absorbents, glands, nerves, muscles, bones and their appendages " were discussed in that order. This " bird's-eye view " was followed by lectures on specific anatomy. Bones were studied first and then " in a fresh subject " he took up muscles, the male organs, the joints, the viscera and female organs, the organs of

[36] *Ibid.*, p. 113. [37] *Ibid.*, p. 113. [38] *Ibid.*, p. 113. [39] *Ibid.*, p. 113. [40] *Ibid.*, p. 87.

[41] Peachey, G. C.: *L. c.*, pp. 128-130. (Quoted from a syllabus of the anatomical lectures of Hunter and Cruikshank given in the " European Magazine " for September, 1782).

Fig. 2.

"The Dissecting Room" Drawn by T. Rowlandson.

(From James B. Bailey's "The Diary of a Resurrectionist." S. Sonnenschein and Co., London, 1896.)

"This picture is said to represent Dr. William Hunter demonstrating to the Class in the Dissecting Room at the Great Windmill Street School."—F. G. Hallett in "Catalogue of Portraits and Busts in the Royal College of Surgeons of England."

sense and integuments and the brain and nerves. Diseases of bones and diseases of the viscera were examined; "chirurgical diseases more particularly, and the operations of surgery" were explained and performed upon a fresh subject. The course concluded with lectures on the anatomy and physiology of the gravid uterus and foetus, the diseases peculiar to sex, pregnancy and parturition and the disorders and management of women in child-bed and of children.

Hunter's wide recognition and experience as a teacher, the advantages of a school planned and built on purpose for the study of anatomy and the extensive museum of excellent preparations combined to draw students to Great Windmill Street School. The men associated with him and those who succeeded him did their share in building the reputation of the school.

William Hewson (1739-74) was an assistant and later a partner of Hunter in the Litchfield Street School.[42] He joined Hunter at Great Windmill Street School and had a small apartment assigned to him there. The advertisement[43] for the first class refers to "Dr. Hunter and Mr. Hewson's Course of Anatomical Lectures."

Benjamin Franklin (1706-90) enters into the history of Great Windmill Street School in an interesting way. Franklin was in London as the "official agent for Pennsylvania and more and more the unofficial voice of America."[44] He resided at the home of Mrs. Margaret Stevenson during his years in London.[45] Her daughter, Mary (familiarly known as Polly), married William Hewson in 1770. Franklin was a warm friend of the Hewsons and also a friend of Hunter. Franklin and Hunter were among those who signed Hewson's recommendation for membership in the Royal Society in 1769.[46]

Hewson and Hunter had a disagreement in 1771 and the partnership at Great Windmill Street was dissolved. The misunderstanding evidently arose regarding the ownership of certain anatomical preparations. Hunter believed that all of the specimens prepared by

[42] Richardson, B. W.: William Hewson, F. R. S., *Asclepiad*, vol. 8, p. 152, 1891.
[43] Peachey, G. C.: *L. c.*, p. 122.
[44] Van Doren, Carl: Benjamin Franklin, N. Y., Viking Press, 1938, p. 288.
[45] *Ibid.*, p. 272.
[46] Gulliver, George: Introduction to the Works of William Hewson, London. Printed for the Sydenham Society, 1846, p. xvi.

Hewson belonged to him and were at his absolute disposal. Hewson understood that he had the right to make preparations for himself if he did not in any way neglect the common interest of the partnership. As a friend of both men it was Franklin's unpleasant duty to listen to their complaints and act as an arbitrator.[47] Hewson established his own school in Craven Street. He died May 1, 1774 from a wound incurred in making a dissection.[48] The continued kindnesses of Franklin to Hewson's family showed his sincere interest in his London friends.

John Sheldon (1752-1808) was a pupil of William Hunter and Hewson. He was an ardent admirer of Hewson and probably left Great Windmill Street when the Hunter-Hewson partnership was dissolved.[49] He went as an assistant to Hunter after Hewson's death. He opened a school of anatomy in Great Queen Street in 1777 which, like the schools established by John Hunter and William Hewson, also reflected the influence of William Hunter as a teacher.[50]

William Cruikshank (1745-1800), a native of "Auld Reekie" and a graduate of Glasgow, came to Great Windmill Street School in 1771 and assumed charge of the library, the dissecting room and the museum.[51] Hunter admitted him to partnership in 1774. He refers to him in his "Introductory Lectures" as "being particularly attentive to the lymphatic system" and "at my desire, has traced the ramifications of that system in almost every part of the body." These studies formed the basis for *The Anatomy of the Absorbing Vessels of the Body* (1786) which was one of Great Windmill Street's finest contributions to medical science.[52]

Hunter died in 1783. Cruikshank and Matthew Baillie were left as co-heirs to the freehold of the Great Windmill Street premises and the use of the museum there for thirty years.[53] By the terms of the

[47] *Ibid.*, p. xvii.

[48] Foot, Jesse: The Life of John Hunter, London, Becket, 1794, p. 37.

[49] Teacher, John J.: Catalogue of the Anatomical and Pathological Preparations of Dr. Hunter, Glasgow, James Mac Lehose and Sons, 1900, p. xlvi.

[50] Thomson, John: *L. c.*, vol. 2, p. 514.

[51] Pettigrew, Thomas: Biographical Memoirs of the Most Celebrated Physicians, Surgeons, London, Whitaker and Co., 1839, vol. 3, p. 3 (William Cruikshank).

[52] Macmichael, William: Lives of British Physicians, London, John Murray, 1830, p. 228.

[53] Peachey, G. C.: *L. c.*, p. 124.

will dated July 27, 1781, Hunter's museum and £8000 eventually were to go to Glasgow University. Glasgow tried to persuade Baillie to relinquish the museum at once in return for suitable recompense. Baillie felt, however, that both Cruikshank and he needed the income from the lectures for which the anatomical preparations of the museum were necessary.[54]

Baillie (1761-1823) was logically the person to follow in the line of the teachers associated with Hunter. He was a nephew of William and John Hunter and had been closely associated with the former.[55] He joined Cruikshank in continuing Great Windmill Street at the age of twenty-two.[56] His success as a lecturer was such that the enrollment of the school did not diminish after the death of his uncle.[57] He stressed the great value of anatomy to the physician and desired to show that a minute anatomical knowledge was as necessary for the physician as it had always been considered for the surgeon.[58] He possessed his uncle's ability as a teacher.[59]

From Baillie's studies at Great Windmill Street came his *Morbid Anatomy of Some of the Most Important Parts of the Human Body* (1793) [60] which was " the first attempt to treat pathology as a subject in and for itself." [61] William Hunter's specimens, his own preparations and his detailed and accurate notes obtained at every opportunity were used in this systematic treatise on morbid anatomy. In the *Engravings of Morbid Anatomy* which accompanied this work, 114 of the 207 figures were from specimens in William Hunter's museum. The majority of the others were made from specimens Baillie had prepared while at Great Windmill Street School.[62]

James Wilson [63] (1765-1821) began as Baillie's demonstrator in

[54] Teacher, J. H.: *L. c.*, p. lxxiv.

[55] Macmichael, William: *L. c.*, p. 236.

[56] Fox, R. Hingston: *L. c.*, pp. 26-27.

[57] Wardrop, James: Life of Matthew Baillie (In Works of Matthew Baillie, M. D.), London, Longman, 1825, vol. 1, p. xxvi.

[58] *Ibid.*, p. xxiv.

[59] Munk, William: *L. c.*, vol. 2, pp. 402-412.

[60] Macmichael, William: The Gold-headed Cane, London, John Murray, 1828 (2 ed.), p. 262.

[61] Garrison, Fielding H.: An Introduction to the History of Medicine, Philadelphia, Saunders, 1929 (4 ed.), p. 355.

[62] Teacher, J. H.: *L. c.*, p. lxxiv.

[63] Pettigrew, Thomas: *L. c.*, vol. 2, p. 5 (James Wilson).

1785. When Baillie left Great Windmill Street School in 1799, Wilson became Joint Anatomical Lecturer with Cruikshank and continued as a lecturer there until his death. He purchased the freehold of the premises in 1807 and dwelt in the house as both Hunter and Baillie had done.[64] Brodie in a letter to Craigie referred to Wilson as "facile princeps among the London anatomists of that day."[65] Wilson's minute knowledge of anatomy was widely respected and the medical profession of that period esteemed him as "one of the most judicious practical surgeons."[66]

Honoratus Leigh Thomas (1769-1846) succeeded to the teaching position and the practice of his father-in-law, William Cruikshank.[67] Thomas gave only a few of the lectures in anatomy. His task was to superintend the dissecting-room and give a demonstration there for an hour each day.[68] He was developing a large private practice and "was not very fond of his vocation as a teacher."[69] He often played truant and Benjamin Brodie (1783-1862) frequently gave some of his demonstrations.[70] Many of his duties fell to Wilson who not only had unlimited enthusiasm for teaching but great stores of energy as well. Thomas resigned his position at Great Windmill Street School in 1805.

At Wilson's invitation, Brodie was asked to assist him as demonstrator during the winter session of 1805-06.[71] Brodie was then only twenty-two. He later lectured conjointly with him in the principal course. Brodie appreciated his opportunity to learn as he taught. Years afterwards he wrote that without his teaching experience in anatomy he "should not have been able to obtain so extensive a knowledge of diseases and of surgical treatment."[72]

William Hunter's museum was sent from London to Glasgow by sea in 1807.[73] Wilson, of course, had been using the specimens of the

[64] Brodie, B.: *L. c.*, p. 65.
[65] Thomson, John: *L. c.*, vol. 2, p. 741 (Letter of Brodie to Craigie).
[66] Obituary notice: *Edin. Med. and Surg. Jour.*, vol. 18, p. 314, 1822.
[67] Obituary notice: *Lancet*, vol. 2, p. 26, 1846.
[68] Brodie, B.: *L. c.*, p. 30.
[69] *Ibid.*, p. 37.
[70] Holmes, Timothy: Sir Benjamin Brodie, London, Longman, 1864, p. 67.
[71] Thomson, J. H.: *L. c.*, vol. 2, p. 741.
[72] Brodie, B.: *L. c.*, p. 67.
[73] Teacher, J. H.: *L. c.*, p. lxxiv.

museum in his classes but had been gradually building up a collection of his own. He purchased Baillie's interest in Great Windmill Street in 1808.[74] Four years later he decided to rid himself of some of his responsibilities by selling the school and it was offered to Brodie. Brodie declined the offer for he had no money of his own at his disposal. He did not want to undertake such an obligation even if his friends could and would have given him assistance.[75]

Wilson sold the museum and premises to Charles Bell (1774-1842) in 1812 for £2000 [76] which, Bell said, was "all my money to the last penny" and "eighteen pence more." [77] Bell wrote on October 7, 1812 that on the previous day he had given his first lecture in Great Windmill Street to a class of from eighty to one hundred.[78] Among the many publications of Bell during his Great Windmill Street years were his papers on the nervous system presented before the Royal Society.[79] John Shaw [80] (1792-1827), his brother-in-law, assisted him in his lectures, demonstrations, experiments and in the preparation of specimens for his museum.[81] Shaw was the author of a *Manual of Dissection* (1821) which was based on the demonstrations at Great Windmill Street. It was widely used as a text in the United States.

Shaw desired more time for his surgical practice so in 1824 Bell decided to sell the larger part of his museum. The collections were purchased by the Royal College of Surgeons of Edinburgh for £3000.[82] In 1826 the school and the remainder of the museum were sold to Herbert Mayo (1796-1852) and Caesar Hawkins (1798-1884).[83] Bell accepted a chair at London University which was

[74] Peachey, G. C.: *L. c.*, p. 124.

[75] Brodie, B.: *L. c.*, p. 65.

[76] Bettany, G. T.: Eminent Doctors—Their Lives and Their Works, London, John Hogg, 1885, vol. 1, p. 290.

[77] Struthers, John.: Historical Sketch of the Edinburgh Anatomical School, *Edin. Med. Jour.*, 12: 440, 1866-67.

[78] Hawkins, Charles: London Teachers of Anatomy: a Retrospect, *Lancet*, vol. 2, p. 536, 1884.

[79] Struthers, John: *L. c.*, p. 440.

[80] Dictionary of National Biography (Edited by Sidney Lee), Macmillan and Co., 1894, vol. 51, p. 440.

[81] Power, D'Arcy: Sir Charles Bell, *Brit. Jour. Surg.*, vol. 11, pt. 2, pp. 405-409, 1924.

[82] Bramwell, Edwin: Sir Charles Bell, *Edin. Med. Jour.*, vol. 42, p. 258, 1935.

[83] Hawkins, Charles: *L. c.*, p. 536.

established that year but continued to lecture at Great Windmill Street in the session of 1826-27.

George Gisbourne Babington [84] (1795-1856), a cousin of Thomas Babington Macaulay, assisted Mayo and Hawkins. The enrollment was steadily declining and Great Windmill Street School was offered for sale. Negotiations with Samuel Lane [85] were unsuccessful and he established a school of his own next to St. George's Hospital. It, like several others, was also "a genuine artery of the old Windmill Street stock." [86] Hawkins left for St. George's in October, 1830. Mayo received an appointment to the faculty of King's College [87] but gave lectures at Great Windmill Street in the spring of 1831. Thomas Tatum gave the demonstrations for the winter course of 1830-31 and Gregory Smith and Richard Bushell lectured for a short time.[88] David Craigie relates [89] that he accompanied Mayo to Great Windmill Street in July, 1831. The museum was being dismantled and there was "dilapidation and desertion" all around the place.

A new era in medical education was in its ascendancy. The day of the private schools was almost at an end. William Hunter would have rejoiced to see the greater schools in the colleges and in the large hospitals. Alone and without help, he had established a place of instruction which had an extensive and effective influence.[90] Great Windmill Street School had helped prepare the way for the more ample colleges which followed.

Medical and surgical leaders of that period had been trained there. Some of them had been bred as teachers in this Hunterian school. The names of the eminent men who taught and studied at Great Windmill Street would alone keep the name of the school from oblivion. Preparations from the school's museum had been taken to other places and continued to be of help in the dissemination of

[84] Plarr, Victor G.: Lives of the Fellows of the Royal College of Surgeons of England, Bristol, John Wright and Sons, Ltd., 1930, vol. 1, p. 39.

[85] *Ibid.*, vol. 1, p. 677.

[86] *Ibid.*, vol. 2, p. 50.

[87] Power, D'Arcy: The Hospitals With Medical Schools, *Brit. Med. Jour.*, vol. 2, p. 145, 1895.

[88] Hawkins, Charles: *L. c.*, p. 536.

[89] Thomson, John: *L. c.*, vol. 2, p. 742.

[90] Handley, W. S.: Makers of John Hunter, *Lancet*, vol. 1, p. 372, 1939.

anatomical knowledge. William Hunter's collection went to Glasgow; Cruikshank's specimens were purchased by the Russian government and taken to St. Petersburg; Bell's museum (which included Wilson's preparations) went to Edinburgh. Important research had come from Great Windmill Street. The dissecting-room and the museum furnished the material for some of the medical classics which date from that period. But more than any of these accomplishments, the absolutely necessary foundation of anatomy, had been conscientiously and carefully taught to innumerable students and the school's teachings had been carried far and wide.

Great Windmill Street School of London had done its work, and had done it well.

THE PANTOCRATOR, THE IMPERIAL BYZANTINE MEDICAL CENTER OF XIITH CENTURY A. D. IN CONSTANTINOPLE

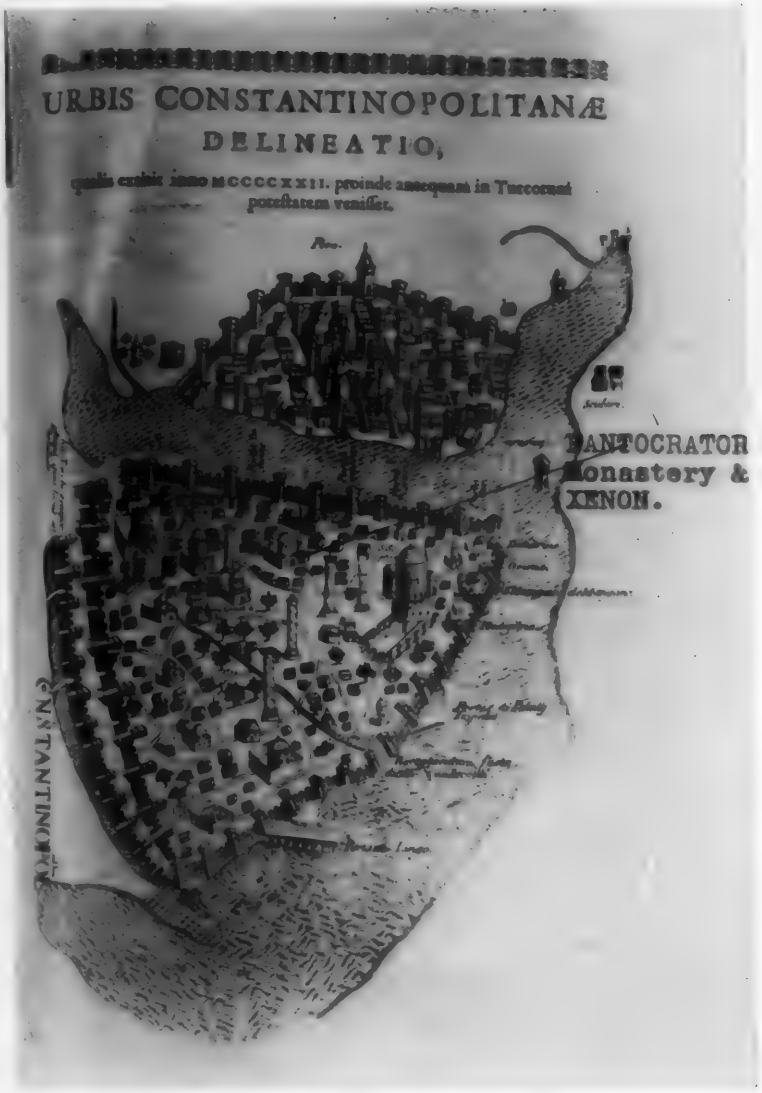
PAN S. CODELLAS

The ecclesiastical historian Sozomenos (iii, 16) relates the circumstances after which the first institution, that really conforms to our conception of a hospital, was founded in 370 A. D. at Edessa in Syria, on account of a famine which had caused an epidemic. "The town of Edessa being afflicted by famine, the hermit Ephraim came forth from his seclusion to upbraid the rich with their hard-heartedness in allowing the poor to die instead of devoting a part of their superfluous wealth to their relief. 'That wealth which you are so carefully amassing,' he said to them, 'will not only serve to condemn you, while you are losing your own souls, which are worth more than all the treasures on earth!' Persuaded by these words, the rich people of Edessa informed him of their inability to decide upon the person to be entrusted with the distribution of their wealth, as the people of their acquaintance were all covetous and might put it to a wrong use. 'And,' Ephraim asked them, 'what is your opinion of me?'—'You are an honest man,' they replied, 'and shall gladly give you charge of the distribution of our alms.' He thereupon received sums of money from them and immediately ordered about three hundred beds to be fitted up in the public porches and there attention was devoted to all those suffering from the effects of the famine, strangers and inhabitants alike."

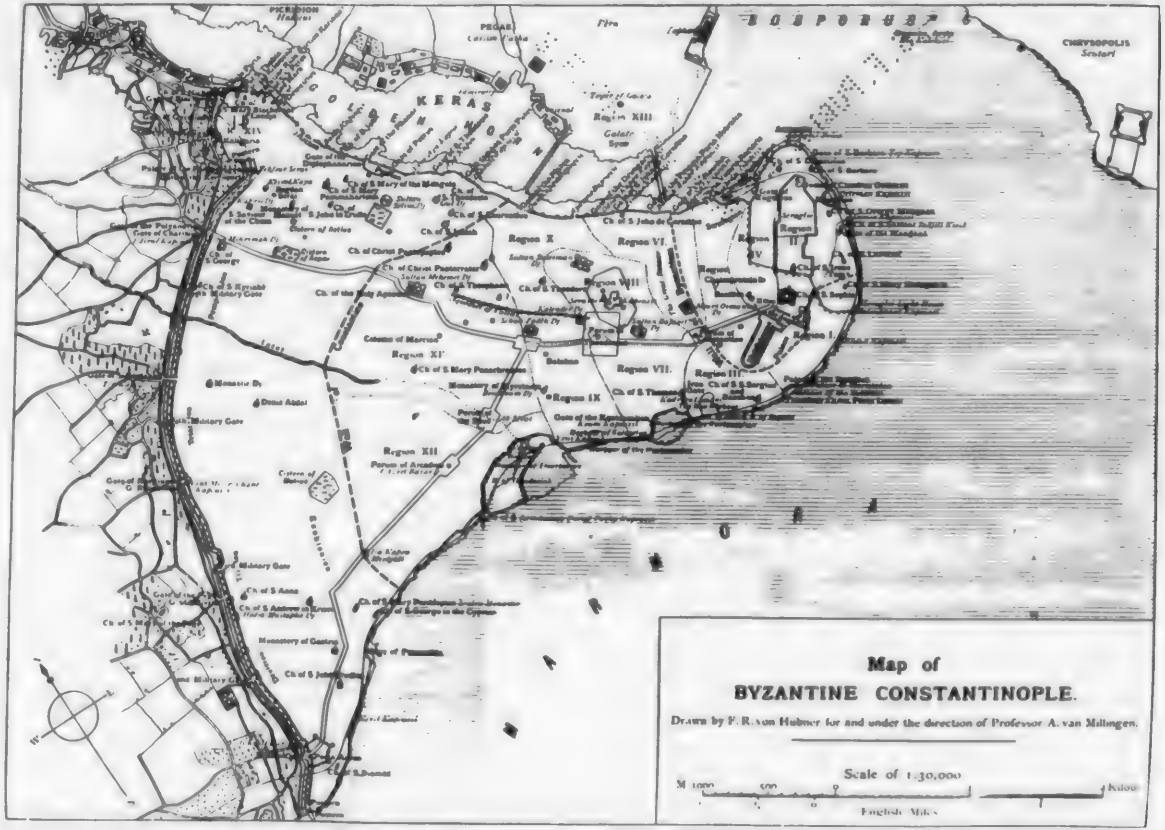
Basil of Caesarea in Cappadocia opened his great 'hospital city'[1] in 375 A. D. Between 400 and 403 Chrysostomos[2] built several hospitals in Constantinople. Others not of one class exclusively followed this movement and the number of hospitals greatly increased. In Constantinople the multitude of the charitable foundations brought in specialised hospitalisation, care and housing.

In this paper will be offered the organization, administration, scope and type of services rendered in the *Xenon* or Hospital of the

[1] Gregory Nazeanzeos, Orat. XLIII in Laudem Basilii Magni.
[2] Migne, Patrologia Graeca, CXVII, 20.



Constantinople in MCCCCXXII (Du Cange).



City Map of Constantinople from *Byzantine Churches in Constantinople* by van Millingen.
The Pantocrator is in Region or Precinct XI

Monastery *Pantocrator* endowed and founded by Joannes II Comnenos (1118-1148) Emperor of the Byzantion in 1136 A. D.

The sole information we have about the Xenon of the Pantocrator is contained in a MS. of the *Typicon* (= Ordinance, or the Rules, Regulations, and wishes) of the founder Joannes II Comnenos.[3] Few minor and insignificant details will be borrowed from ordinances

Joannes II Comnenos, Emperor of Byzantion, from a coin illustrated in the Works of Du Cange and copied by my friend Mr. Jack Tandy of San Francisco.

of other similar endowment institutions, because they simply are not set in the Typicon of Joannes II Comnenos. Other aspects concerning the conditions that prepared and developed this motivation for the origin, evolution, growth and progress of these philanthropic institutions will not be touched upon.

[3] Joannes II Comnenos, Typicon, ed. A. Dimitrevsky, Typica, I, pp. 656-702.

P. Bezobrazov, Unpublished Kloister Regulae (Russ.), Journal of the Ministerium of 'Volksaufklärung,' Petersburg, 1887, Bd. 254.

November Fasc., pp. 65-78.

Reviewed by Ed. Kurtz in Byz. Zeitschr. II, Band Jahrgang, 1893, pp. 267-631.

Karl Krumbacher, Byzantische Literaturgeschichte, München, 1897, p. 317.

G. Paspates, Byzantine Studies (Greek), Constantinople, 1872, pp. 309-313.

Ar. P. Kouzes, Archives of Medicine (Greek), XVth Year (1920), Athens, p. 40 ff.

Ib. The Byzantine Hospitals and the Practice of Medicine by the Clergy during the XIIth century A. D. Article in Megale Hellin. Encyclopaedia, *s. v.* Xenon.

The MS. of the Typicon of Joannes II Comnenos was in possession of the

City Map of Constantinople from *Byzantine Churches in Constantinople* by van Millingen.
The Pantocrator is in Region or District XI

The Monastery Pantocrator consisted of a group of buildings, which were all enclosed by a fairly strong wall, thus making a complete physical and administrative effectuality. It was situated in a very conspicuous location and was easily noticeable from a distance, impressing the spectator and leaving its mark upon his mind. The Pantocrator was one of the great and splendid monasteries in Constantinople, whose ruins today represent the Mohammedan temple Zeirek-kilisse-tzami,[4] and had like all the Greek monasteries of those times two separate hospitals, one the *triclinon* or *triclinarion* for the hospitalization of the sick monks, which according to the Typicon ought not to be less than eighty, and the second, the *Xenon* or Main Hospital for the sick poor persons of the city.

The triclinon was a special department of the monastery containing six beds assigned for the sick monks and was under the supervision of the abbot of the monastery. These beds were always in order and ready to receive such patients. Whenever one of the monks complained of an ailment or reported himself sick, he was taken to one of the six beds. The *Nosocomos* of the Xenon immediately had to notify the physician of the Outpatient Department on duty for that month. Promptness was imperative.

The physician would visit the sick person in his bed, take his history, examine him, come to a diagnosis and then order the treatment, diet and management. If the nature of the case was of urgency or necessity, the physician would remain close to the patient occupying the bed especially provided for such an occasion.

All the drugs, appliances, instruments and supplies were brought from the Xenon.

The abbot in charge of this service was responsible for the good quality, purity and proper kind of foodstuffs, especially of the two main articles, bread and wine. It may be said in general of everything "that could console the person." Furthermore the abbot saw

Theological Seminary Chalke in Constantinople. At present it is not known where or in whose possession it is. According to Kurtz a copy was made from the original in 1749 and was found by Bezobrazov in the library of Woiwode Nikolaes Mavrokordatos. A second copy was found by Bezobrazov in the island of Zakynthos in private possession. It is asserted that this copy was made from the Chalke MS. and was seen by Bezobrazov with his own eyes. The number of the MS. was 85.

[4] Alexander von Millingen, Byzantine Churches in Constantinople, London (1912), p. 219 ff.

Pantocrator; Present day ruins, Zeirek-kilisse-tzami.

that the proper nursing and care was given. The sick monk was entitled to better food and some comfort and laxity from the rigidity of the monastic canons, especially of the religious and dietary nature, ' that the suffering body may be assisted.'

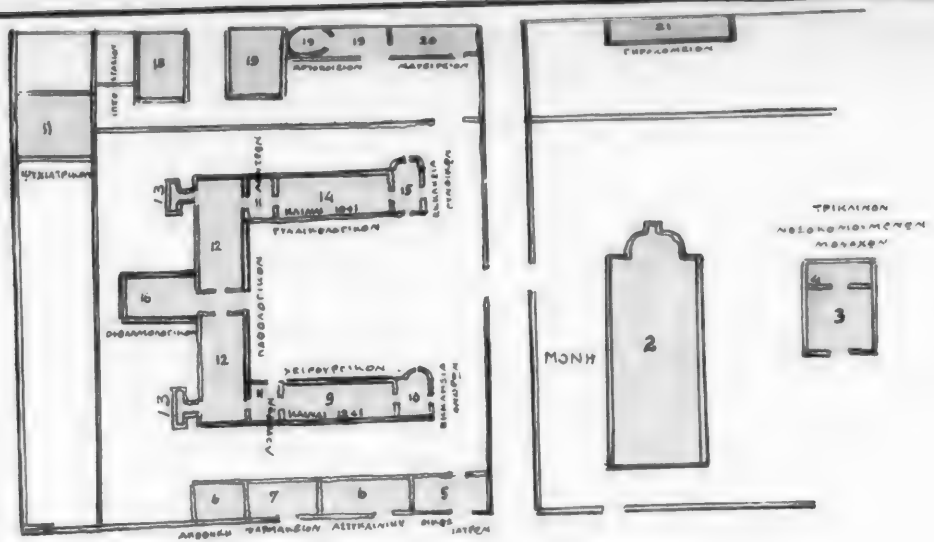
Some ordinances specifically state that monks ought not to take advantage of such occasions and be " unreasonable, because sickness is a trial and should suffer like monks." Malingering is also caustically criticised and condemned. For the sick monks were also set aside six baths in the balneum of the monastery. Baths were given or taken by the orders of the physician only. The slightly sick monks were taken care of in their cells, where the doctor had to visit them daily and advise and prescibe what was deemed beneficial for restoration of health.

The Xenon was devoted to the sick poor persons of the city, not accepting or admitting any monk or employee. Those housed at the Old Men's Home, The Gerocomeion, were entitled to admittance and care in the Xenon. The *Gerocomeion* was a separate department taking care of twenty-four persons, totally disabled for any kind of work. In case one of the aged persons became sick, the eldest of the Home would notify the *Nosocomos* or the male nurse of the Xenon, or the servant, who would call the physician or the interne of the Xenon; the latter had to come and look over the patient in the Home. If the condition was of such nature that hospital care was indicated, the old man was transferred to the hospital and was treated there and remained until he was completely restored to health. Then he was discharged and returned to the Home.

The *Xenon* contained fifty beds. Ten beds formed an *Ordinon*, or a unit or a ward. Each ordinon was assigned to a distinct type of case, as patients suffering of ' wounds and fractures,' eye diseases, acute ailments, women's diseases. For the Sacred Disease (Epilepsy) by itself there was a special ward or service. To these was attached an Outpatient Department for the sick that could not or did not desire to be hospitalised.

The various services then may be designated as: Medicine, Surgery, Gynaecology, Ophthalmology, Psychiatry, and Outpatient.

The *Medical Service* consisted of twenty beds making up two ordina or units, of ten beds each. In this service were received



ΑΝΑΠΑΡΑΣΤΑΣΙΣ ΤΩΝ ΚΑΙΝΙΚΩΝ
ΤΗΣ ΕΝ ΚΩΝΣΤΑΝΤΙΝΟΥΠΟΛΕΙ ΜΟΝΗΣ ΤΟΥ ΠΑΝΤΟΚΡΑΤΟΡΟΣ,
ΚΑΤΑ ΤΟ ΤΥΠΙΚΟΝ ΤΟΥ ΑΥΤΟΚΡΑΤΟΡΟΣ
ΙΩΑΝΝΟΥ Β' ΤΟΥ ΚΟΜΝΗΝΟΥ.

The Pantocrator: The Imperial Byzantine Medical Center of Constantinople of Constantinople in the XIIth Century A. D.

LEGEND:

1. The church of the Pantocrator.
2. The Monastery.
3. The Triclinon of the sick Monks.
4. Baths.
5. Quarters for the doctors.
6. Outpatient Service.
7. Pharmacy.
8. Store Room.
9. Surgical Service.
10. Church for the male patients.
11. Baths.
12. Internal Medicine.
14. Gynaecology.
15. Church for women patients.
16. Ophthalmology.
17. Psychiatry.
18. Stables.
19. Bakery.
20. Kitchen.
21. Gerokomeion.

This Plan has been worked out by Basileios Tsagres, Architect of Athens, based upon the Typikon of the Emperor Ioannes II. Comenos. Copy by Mr. Nick Chavallas of San Francisco, California.

patients suffering from various internal medical diseases, like pestilential, pulmonary, gastric, etc., except of acute or painful sickness: nephrolithiasis, cholelithiasis, or gastro-intestinal diseases (dysentery, enteric catarrh, etc.) and those that had to take catharties. The *Medical Staff* consisted of two *Physicians-in-Chief*, called *Protomenytae*, three *Embathmoi Physicians*: students or apprentices of medicine, that had completed their course (House Officers, Residents), two Internes: *Perissoi Hypourgoi*, and finally two *Servants* or male nurses or orderlies.

The *Surgical Service* consisted of ten beds, one ordinon. In this service were received patients that had sustained wounds, fractures, luxations and in general all those in need of surgical care. The staff of this department was composed of two doctors for wounds (traumata), called *Traumaticoi* (Surgeons), three residents, two internes and two male nurses or orderlies. For the cases of hernia there was a specialist called *Kelotomos*. In the Xenon were surgical instruments easily accessible, phlebotome, odontagra for the dental operations, catheter for the urological intervention, cauteries, instruments for operations on the head and the abdomen. In addition there were various sorts of bandages. The special *Grind-man* or sharpener of the monastery was required to keep the cutting surgical instruments clean and sharp. We may suppose here, as in the monastery of the Cosmosoteira, the abbot was required under a specified agreement to have permanently housed in the monastery a 'iatros clasmaticos,' or a physician for fractures.

The *Gynaecological Service* had twelve beds and was considered as one ordinon. To this unit were admitted women patients suffering from various diseases, medical or surgical or gynaecological. To this we may include *Obstetrical* cases and *Paediatric* as well. The personnel of this department was made of two *Iatroi Gynaekeioi*: physicians for women, or gynaecologists, one *Iatraina* or Female doctor practicing midwifery and gynaecology, four female residents, two female internes and two maids or nurses.

The *Ophthalmological Service* was a ward of eight beds making a complete unit by itself. To this service were admitted patients suffering from every kind of eye affliction, or in need of eye-operation. Here also slept the patients that had cathartic administered to them,

those suffering from acute painful or colicky conditions. This was done not to disturb the seriously sick of the other wards. In the plan of St. Gall (800 A. D.) phlebotomy patients were also put in this ward.

The *Psychiatric Service* was housed in an absolutely special part of the Xenon but was very conveniently situated in order to make access easy to the rest of the dining rooms and wards, and to make the care of the patients without extra effort, handy and prompt. This unit received patients suffering from the *Sacred Disease* (Epilepsy), and as might be expected, from various mental disorders. It is probable that there the mentally deranged monks were taken care of also.

The *Outpatient Department* was an entirely special service forming an intimate part of the Xenon for the care of the outpatients, as it is done today in the clinics of the universities or hospitals. The clinic types of cases were of such nature that hospital care was not needed or they did not desire to be hospitalised. The service they were receiving consisted of taking a complete history of the complaint, a physical examination, a diagnosis, and supplying of the necessary medicaments. Instructions were given for the management of the condition, and they were advised to return on a date that was deemed most helpful for the cure of the ailment.

The Staff of the Outpatient Service consisted of four doctors, two of which were Internists: *Diaiteticoi* and two Traumaticoi, four accomplished apprentices and four internes. If there was a gynaecological case that needed surgical intervention, the traumaticoi took care of it. Each of the assistants or internes alternately served for one month the sick monks in the triclinon as it was mentioned above. In case the clinic patient upon examination and study was found or thought to be of a difficult nature to diagnose and treat, the director of the Outpatient Department was notified. Now the latter was required to ask the ablest and in his opinion the most experienced of the Xenon to offer his services and opinion about a most logical diagnosis. After the consultation reached a final diagnosis, then the therapy was outlined and ordered.

The entire hospital staff did not serve at the same time, but alternately each month, so that each physician was on duty for six

months a year. The dispensary received patients all day, during any hour. From the First Day of May to the Fourteenth Day of September (The Holiday of the Finding of the Holy Cross) there was also an evening period for visits to the clinic after the usual psalm-chanting. The doctors were required by all means to look over the patients with great care, to prescribe the best fitted therapy and give the proper directions " as they will have to give an account of them to the Almighty."

After the clinic work was finished, the doctors washed their hands in the copper basins which were provided for this purpose in each ward (*chernivoxesta chalca*). Now the special *Strator* or groom of the monastery had the horses of the doctors ready in the stable. Their doctors mounted their horses and went away to other tasks.

When the night had come, and naturally the place became dark, there was one *Candela* (suspended oil lamp?) in each ward and each corridor and other parts of the hospital which were used by the patients. A triple candela was placed above the doctors' cathedra (desk or room), so that the compounding, preparing and dispensing supplies and medicines that had to be used on the patients during the night could be executed with plenty of light. The night watch was required to administer these medications. This was called the *Excubetores*: excubitores, vigiles. There was stationed one embathmos in each ordinon and one hypourgissa in the women's ward.

Besides the officers mentioned above there were in the monastery two *Optiones*, which, I believe, were the bookkeepers and purchasing agents and treasurers, and one *Teacher of Medicine*. The student of medicine, a son of a physician or not, besides the *rotation* clinical experience he received in the dispensary, treated the monks at the triclinon, studied the gynaecology and the rest of the departments, and was required to attend the lectures on the theory and practice of medicine given by the teacher of " the Science of Medicine." This lecture course consisted probably of anatomy, physiology and the humoral and other theories of the times. This was a sort of an unofficial medical school. The Lecturer or Professor of Medicine was warned not to hold such an appointment or office as a mere paper title and an excuse to draw the compensation, but he must teach the students with diligence and unremitting zeal. If he failed to do so,

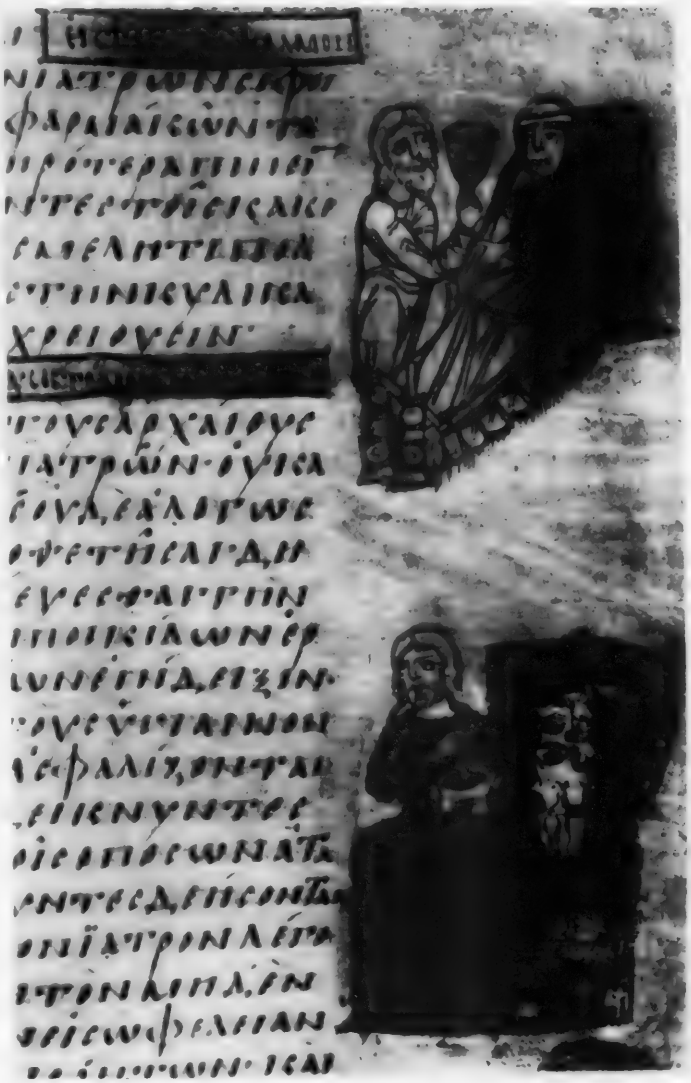
Portrait of the Byzantine physician Apocaucos (XIIIth cent.).
Nat. Bibl., Paris, Greek MS. No. 2144. XIVth cent.

he was discharged and another teacher, abler, more competent and more efficient, was hired to fill the post with credit as the Typicon demanded.

Every staff physician was required to serve personally according to the rules laid down by the founder; he was forbidden to allow a staff member of lower rank and less experience to substitute for him, he was also not allowed to take long trips, even if the emperor had commanded; he was not permitted to leave the city and make professional calls, even on persons most closely related to the emperor, or on nobles or officials. At that time almost the entire medical staff was composed of clergymen. Articles which were the property of the Xenon should not be used for any other purpose or outside the monastery.

The *Pharmaceutical Service* of the Xenon was in the hands of a special personnel consisting of one *Epistemon of the Pimentum* or Director of Scientific Pharmacy, three *Embathmoi Pimentarii* and two *Assistant Pharmacists* (Perissoi Pimentarii). The duties of these persons were to compound the medicines and fill the prescriptions for the Triclinon of the monastery, the Xenon and the Dispensary. The simple preparations were at hand in the various departments, because it was the duty of the *Meizoteros* or Oeconomos or Stewart to purchase them for future use or need.

Two doctors of experience called *Primicerii* (Superintendents) were charged with the general supervision of the hospital. They served alternately for a month. Their duty was to visit each patient in his bed, examine the same, check up the therapy, whether it was of recognized value or benefited the sick, inquire about the nursing and care, look over the prescribed diet and ask individually each patient, if he had any complaint to make. If there was anything wanting, it was added; on the contrary, if there was anything unessential and superfluous, or not of accepted use, it was discontinued. Any person against whom a complaint was made, if it was supported by facts, was reprimanded; any one that was doing his duty carelessly was severely reproved. The Primicerius, in order to discharge his duties efficiently, had no ordinon to take care of. He was the person with authority to point out the consultant for the difficult cases, as we saw above.



Byzantine physicians: one offers a potion to the patient, the other prepares the medicine, IXth cent. (Paris, Nat. Lib. MS. Grec. 923, f. 210).

We may say that the Primicerius was the Chief Administrative Officer. Among the group of buildings comprising the Pantocrator were two *Churches* of the Xenon, one for the men and the other for the women patients with the proportional and adequate clerical staff of *Priests*, *Anagnostes* (Lectors) and others to take part and officiate as it is required by the Ordinance of the church.

In addition there was a Bakery, *Mangipeion* (Manucipium), with a complete crew (manceps) of master bakers and subordinate help of both sexes, male and female.

There was a *Mill* with a Miller, horses to run the mill and a special man to keep the stones in the right condition to grind the flour to the desired fineness. There was furthermore a *Stable* in charge of a groom, which also took care of the horses of the doctors while they were on duty in the Xenon. There was an *Ostiarius*, Door Keeper (of the Xenon?); one *Pyloros*, or Gate Keeper of the whole Foundation; a *Kitchen*, Magereion, with various sorts of cooks, assistants, help, dishwashers, potwashers and other persons responsible for preparing the food-stuffs and keeping the utensils and whole department clean and in good condition; a *Laundry*, Plynterion, with a crew of women to wash with soap and water, to rinse and mend the clothing. Finally there was a *Xenotaphion*, the Cemetery for the 'xenos,' the guest, wherein the patients that had passed away in the Xenon were buried. There was a complete service of undertaking according to the customs. The burial was performed with the prescribed grade of dignity and the required number and rank of priests. Grave Diggers, Pall Bearers and others took part thus making the burial appropriate, respectful and conformable to the Greek Orthodox Church.

The Scale of Salaries of the Xenon are specified in the Typicon. The highest is the one allotted to the Teacher of Medicine: 80 gold coins, 50 modius of wheat and a half gold coin for *Prosphagion* (anything that accompanies bread to make a meal). As is seen here, money, wheat and extras are given to cover the whole compensation. The entire expense of the Xenon was annually 136 gold coins, 231 hyperpyra, 1801 rough coins and 2606 modius of wheat.

The greater number of the personnel of the hospital were clerics: monks, priests and deacons, but there were some laymen also. It

appears that when the clerical doctors were away from their religious obligations, they could not do justice to the Church and thus there resulted a considerable loss. This condition forced the Oecoumenical Patriarch, Loucas Chrysoverges, in 1157 to forbid the priests and deacons to become physicians or chiefs of any medical service, in general: "It is impossible to give in and permit the monks wearing the chasuble and tunics and other sacerdotal robes in handling the holy objects to be clothed in worldly garments and with worldly persons, I mean the doctors, to lead the sacred procession."

After the patient was admitted to the hospital, all his clothes were taken away and turned over to the laundry and other kindred services to be washed, cleaned, repaired, if there was a need of repair; in general they were put in good condition and were kept until the day of discharge. Then they were handed back to the patient clean and in good shape. The patient undergoing treatment in the hospital was issued garments of the hospital. The patient according to the nature of his case was assigned to the proper service. In case the right ward was filled and there was no vacant bed, then temporarily he could be placed in another ward, until space would become available. If a department was full and the case was of an urgent nature, due to an acute and dangerous condition needing immediate care and treatment, the patient was placed in a *Paracrevaton*, or extra couch, held in reserve. This was kept in every ordinon.

The bed was supplied with one *Piloton*, a mattress, one pillow, one quilt, a spread and probably some light pieces or sheets. During the cold winter months two *Loonikia*, or woolen blankets were added. For the bedridden patients and those unable to be moved on account of their acute illness or the very dangerous condition of wounds, there were six beds with the mattresses having a hole in the center to accommodate eliminations.

The *Fare* of the patient consisted of one piece of bread and two meals of pulse, which was made into purée, as of peas or horse-beans (Faba vulgaris), with the necessary quantity of oil and onions. Vegetables could be substituted for one meal. A certain amount of money was given for purchasing wine. During the holidays or memorial services of prominent persons gifts were given. In the monastery of Cosmosoteira a certain amount of money was given monthly.

Byzantine physician prescribing for a patient in Greek. Miniature of XVth cent. (MS. in the Nat. Lib. in Paris, Grec. 36, f. 187).

In addition the hospital was provided with *Baths*, which were given as a therapeutic measure when prescribed by the doctor. Hydrotherapy was much used. The Primicerius was responsible for the good condition and the readiness of the baths and the complete supply

Present day ruins of the Library and Scriptorium of the Pantocrator after van Milligen.

of all the needed accessories: ewers, small cadus, lentia (linteum) towels, linen clothes (comosmagia), towels for the head, soap, etc.

The *Method of Treatment* practiced in the Xenon during those times and earlier was in general that of Galen, whose several works have come down to us. Books have survived that were written for the express purpose of the treatment in the Xenons, called *Xenonica*.[5]

[5] Hospital Formularies or Xenonical Formularies exist in the following libraries: Oxford, Barocc. MS. CL. Vienna, Nos. 40 and 43. Paris, Nat. Bibl., No. 2236.

Such books exist in MS. form in Paris, Great Britain and other countries. The physicians of the Xenon wrote their own methods of treatment. Such is the MS. in the Vienna Library of the "Protomenites of the Royal Xenon of Myrelaion Romanus of the Kouvouclesiou, On the Acute and Prolonged Diseases."[6]

Cinnamos[7] in his history states that the Xenones were places where "any one that desired could learn considerable therapeutics and medicine."

Mention must be made of the Library housed in a separate building by itself, where were deposited the MSS. of religious and secular knowledge. The library had a complete personnel of high proficiency. Here also the copying was done by a group of adept calligraphers and miniature artists.

The final history of the Xenon of the Pantocrator is not known. We may follow the various phases and roles played by the monastery fairly well to the present status, but of the Xenon after the Latin occupation of Constantinople I have no continuous story as yet to present. I doubt if this can be accomplished even in the future without wide conjectures.

In closing I may remark that the title "Medical Center" is fully justified.

Munich, No. 105. Florence, Plut. VII, XIX, No. 7 of about 58 chapters. From head to foot arrangement.

The Baroccian MS. bears the title: "*Θεραπευτικαὶ καὶ Ἰατρεῖαι συντεθεῖσαι παρὰ διαφόρων ἀνδρῶν ἰατρῶν κατὰ τὴν ἐκτεθεῖσαν ἀκολουθίαν τοῦ ξενῶνος.*"

[6] ROMANUS. *περὶ τῶν ὀξέων καὶ μακρῶν νοσμάτων. De morbis acutis et chronicis.* Greek MS. in Rome: Vatic. 280, XVth cent. f. 162^{v}: *Ρωμανοῦ καὶ Κουβουκλησίου τῆς τοῦ Θεοῦ ἐκκλησίας Ἁγίας καὶ πρωτομηνίτου* (sic) *τοῦ Βασιλικοῦ Ξενῶνος τοῦ Μυρελαίου καὶ τῆς περιβόξου.*

Greek MS. in Vienna: Vindob. med. 48; XIV-XVth cent. f. 1-46: (Inc. *Ρωμανοῦ Κουβουκλισίου κτλ.* . . .).

[7] Joannis Cinnami, Historiarum Liber IV (Migne, Patrologia Graecae, CXXXIII, Paris, 1864).

ANNUAL REPORTS OF CONSTITUENT SOCIETIES

THE BOSTON MEDICAL HISTORY CLUB
1941-1942

The Boston Medical History Club has arrived at the beginning of the third decade of its existence. It is proud of its record during these twenty years, in keeping alive an interest in medical history among the physicians and students of Metropolitan Boston and other parts of New England.

The list of the speakers for the past session of 1941-1942 follows:

November 19—Giovanni Battista Morgagni—in relation to the evolution of the medical thought in the eighteenth century. Arturo Castiglioni, M. D., Yale University.

December 17—The History of Malaria. Colonel Frederick F. Russell, M. D., Harvard Medical School and School of Public Health.

January 21—Osler, his Prescriptions and Materia Medica. David I. Macht, M. D., Director, Pharmacological Research Laboratory, Hynson, Westcott and Dunning.

February 18—Early Contributions to the Study of Delirium Tremens. John Romano, M. D., Harvard Medical School, Peter Bent Brigham Hospital.

March 18—The History of Medicine in the Near East. Bennett F. Avery, M. D., Dean, Boston University School of Medicine.

April 15—The History of Collateral Circulation of the Heart. Herman L. Blumgart, M. D., Harvard Medical School, Beth Israel Hospital.

We wish to note with great sorrow the fact that Dr. Soma Weiss, President of the Club, died on January 31, 1942. Amidst his many pressing duties as Physician-in-Chief of the Peter Bent Brigham Hospital, he was keenly sensitive to the need of carrying on the activities of the Club and gave much thought and time to its welfare. His memory leaves a generous impulse to the continued existence of this organization. The following brief biographical note is appended:

Soma Weiss, M. D., of Boston, died January 31. He was in his forty-fourth year.

Born in Hungary, Dr. Weiss received his degree from Cornell University Medical College in 1923. He was assistant at the Thorndike Memorial Laboratory from 1925 to 1929, assistant in medicine at Harvard Medical School from 1926 to 1927, instructor from 1927 to 1929, assistant professor from 1929 to 1932 and associate professor from 1932 to 1939; he was appointed Hersey Professor of the Theory and Practice of Physic in 1939. He was assistant director of the Thorndike Memorial Laboratory from 1930

to 1932, director of the Second and Fourth Medical Services (Harvard) of the Boston City Hospital from 1932 to 1939, and physician-in-chief of the Fourth Medical Service from 1936 to 1939. He was named physician-in-chief of the Peter Bent Brigham Hospital in 1938. He was a fellow of the American College of Physicians, the Massachusetts Medical Society and the American Medical Association.

He is survived by his widow and three children.

The officers elected for the session 1942-1943 are as follows:

President	Joseph Hersey Pratt, M. D.
Vice-Presidents	A. Warren Stearns, M. D.
	Robert B. Osgood, M. D.
Secretary-Treasurer	Benjamin Spector, M. D.
Curator	James F. Ballard
Executive Council	George Sarton, D. Sc., LL. D.
	Henry R. Viets, M. D.

BENJAMIN SPECTOR, M. D., *Secretary-Treasurer.*

CORDELL HISTORICAL SOCIETY OF THE UNIVERSITY OF MARYLAND 1941-1942

Owing to the duress of war activities and the acceleration of the medical course, the Cordell Historical Society held only one meeting this year. On April 29, 1942 the Society was host to the members of the Third Graduate Week in Medical History at the Institute of the History of Medicine of the Johns Hopkins University. Dr. John C. Krantz, Jr., President of the Society, presided over the meeting which was held in Chemical Hall at the University of Maryland Medical School. Dr. Howard J. Maldeis, Chief Medical Examiner of the State of Maryland, discussed "The History of the Medical Examiner's System," and John E. Savage, Associate in Obstetrics at the University of Maryland School of Medicine, spoke on "William Hunter and His Magnum Opus."

The Cordell Historical Society sponsored another series of lectures on the history of medicine given by Dr. Louis A. M. Krause, Associate Professor of Medicine. Dr. Krause lectured on "The History of Scourges" in 1941-1942. There was much enthusiasm shown for these talks which were open to the public as well as the student body of the Medical School.

JOHN C. KRANTZ, JR., *President,*
JULIA E. WILSON, *Secretary.*

HISTORY OF MEDICINE SOCIETY OF TULANE UNIVERSITY
1941-1942

The History of Medicine Society of Tulane University was founded during the academic year of 1933-34, due to the interest and efforts of R. Gordon Holcomb, Gus Dawson and B. Bernard Weinstein. Prior to the advent of the Society, there was no organized interest in the medical history on the Tulane Campus. The earlier papers were all contributed by the members and later various guest speakers, usually from the Faculty, gave papers. A list of these papers through 1940-1941 have been published in previous issues of the Bulletin. The early meetings were attended by members only. Later to stimulate interest in the History of Medicine Society, lectures were made available to the entire student body.

This year in an effort to broaden the scope of activities of the Society, a series of six "Lectures to the Laity" was inaugurated, patterned somewhat after the successful series which had been given for some time by the New York Academy of Medicine. The speakers for these lectures were carefully selected and the subjects were selected with an eye to popular appeal. The lectures were scientific and medically accurate, but couched in terminology readily understandable by the laity. We were agreeably surprised by the very favorable response to these lectures and it will be continued in the future. The lectures in this series were on:

1. History of Childbed Fever. Dr. Conrad C. Collins.
2. History of Blood Transfusions. Dr. Michael DeBakey.
3. The Army Surgeon. Dr. Ambrose Stark.
4. Land Marks in Cardiology. Dr. Williard C. Wirth.
5. History of Tuberculosis. Dr. Julius Lane Wilson.
6. Three Men from Padua. Dr. B. Bernard Weinstein.

The regular program of the Society continued in the usual fashion, with papers being presented by the membership. During the session 1941-42 the following papers were given:

"Surgical Chair at Tulane University," H. H. Wagenheim.
"History of Yellow Fever in New Orleans," R. M. Landry.
"John and William Hunter," E. B. Cunningham.
"William H. Welch," J. V. Schlosser.
"Noguchi," John Laurens, II.
"J. M. T. Finney," J. Y. Pearce.
"Saints in Medicine," William Leon.
"Rockefeller Institute," S. A. Trufant, III.
"Gorgas," N. C. LaFleur.
"Metchnikoff," J. C. Martin, Jr.
"Kentucky Medicine and Frontier Nursing," G. F. Begley.

"History of Marihuana Addiction," Walter Trautman.
"History of Caesarean Section," G. Jaffe.
"University of Padua," Winston C. Hibner.
"Leonardo Da Vinci," Victor E. Tedsco.

The officers of the Society during the session 1941-42 were:

President	Walter J. Trautman, Jr.
Vice-President	Joseph Schlosser
Corresponding Secretary	John W. Overstreet
Recording Secretary	William B. Stanton
Treasurer	Martin B. Harthcock
Faculty Advisor	B. Bernard Weinstein, M. D.

The newly elected officers for the session 1942-43 are:

President	Charles Wilson
Vice-President	Grant Begley, Jr.
Corresponding Secretary	William B. Stanton
Recording Secretary	G. T. Schneider
Treasurer	Roy White
Faculty Advisor	B. Bernard Weinstein, M. D.

Two years ago the Society instituted an award, namely, the Rudolph Matas Award, for the best student paper during the year and an award, the I. I. Lemann Award, for the best student discussion of a paper during the year. These awards have stimulated considerable interest and competition. They are mentioned here in the way of a suggestion to other organizations in the Council who may find them useful.

The closing banquet dinner of the session is a scene of presentation of the awards and presentation of membership certificates to new members. The banquet has a guest speaker who contributes the paper of the evening. The guest speaker of this year is Dr. Abraham Levinson of Chicago who gave a splendid address on Medical Medallions. The Medical Library Association meeting in New Orleans this year was a guest of the Society and attended the Levinson address.

B. Bernard Weinstein, M. D.

THE INDIANA ASSOCIATION OF THE HISTORY OF MEDICINE
1941-1942

The first meeting of the year 1941-42 was held on Wednesday evening, May 14th at the home of Dr. and Mrs. H. P. Werkman in Brendonwood, Indianapolis, Indiana, with the President, Dr. Mark H. Mothersill, presiding. A biography of Dr. John Stough Bobbs, the father of the operation of

cholecystotomy which he performed in Indianapolis, June 15, 1867, was read by David Goldman. The paper had been prepared by Mr. and Mrs. Goldman. A paper prepared by Miss Anne Acton Welborn of Stewartsville, Indiana, on her activities in gathering material for her medical writings, was read by Mrs. J. S. Skobba. Miss Welborn is from a family of physicians and has written extensively on the medical history of Evansville, Indiana, and Posey County in Indiana. The President led a discussion on the publication of a medical history of Indiana which the Association hopes to sponsor. Attention was called to the article " Insulin Crutches " which appeared in the May 1941 issue of Hygeia. The article was written by one of our members, Mrs. Mabel K. Stabler.

The Association met September 22, 1941 in Hurty Hall, State Board of Health Building in conjunction with Physicians, Health Officers and the Women's Auxiliary of the State Medical Association. Dr. Thurman B. Rice, Professor of Bacteriology, Indiana University of Medicine and Chief, Bureau of Health and Physical Education of the Indiana State Board of Health, talked on the life of Dr. John N. Hurty as told by the pictures which line the walls of Hurty Hall. Doctor Hurty, after whom the Hall is named, was a colorful figure in Indiana medicine and dentistry for forty-four years, from 1881 until his death in 1925. He was secretary of the State Board of Health for twenty-six years, from 1896-1922.

The Association was invited by Dr. E. N. Kime, Professor of Anatomy of the Indiana University School of Medicine to attend the October 29th meeting of the Monroe County Medical Society in Bloomington, Indiana. Several members took advantage of this opportunity to hear Dr. Edgar F. Kiser present an illustrated lecture on early medical authors and their writings. The meeting was held in the new medical school auditorium on the Indiana University Campus.

For the second time the Indiana Association of the History of Medicine held its December meeting in connection with the annual Indiana History Conference. The meeting was held Saturday afternoon, December 13. The President, Dr. Mark H. Mothersill introduced Dr. Burton D. Myers, Dean Emeritus of the School of Medicine, Bloomington, Indiana, who gave a very interesting summary of the various steps in the growth of our medico-educational institutions, from the first one established at New Albany, Indiana, in 1833 to the present highly coordinated Indiana University Medical Center.

The last meeting of the year was held Friday evening, February 20, 1942 in the beautiful Stephen Foster Memorial Hall on the Lilly estates in north Indianapolis. On the program were Mrs. Dorothy R. Russo who read a paper on " Indiana's Medical Literature " and Dr. Henry B. Morrow, Professor of Periodontia at the Indiana University School of Dentistry, who read a paper prepared by Mrs. Mabel Walker on the " History of the Library of the Indiana Dental College and the Indiana University School of Dentistry."

The new officers elected at this meeting for the year 1942-1943 were Dr. E. N. Kime, President and Mrs. Dorothy R. Russo, Vice-President.

EDGAR F. KISER.

THE INNOMINATE SOCIETY, LOUISVILLE, KY.

1941-1942

Last October the Innominate Society started its sixteenth fiscal year. The object of the Society has been the presentation and discussion of papers dealing with subjects of interest or importance in the fields of medical history and the cultural aspects of Medicine.

Papers presented during the past year by members included "The Review of Recent Literature of Medical History," "Doctor John Morgan," "Surprises in X-ray Therapy," "History of Frontal Lobe Localization." The Innominate Society further, has always been quite fortunate in having honored guest speakers. This year was no exception when we were entertained by Dr. Winslow, who discussed "Theories Relative to Causes of Communicable Diseases."

In April 1942 we held our 134th regular meeting. Since some of the members have been called to service, and others are expecting to go at any time, the Society passed the following motion:

"Members induced into Military Services are to be carried on the Inactive List, to be relieved of all dues and obligations, and to be automatically reinstated on their return. No vacancies in the membership list are to be created by this procedure."

We feel that with everyone's help the war will soon be over and we can again enjoy the cultural side of our profession, as well as life in general.

J. DUFFY HANCOCK, *Permanent Historian,*
J. MURRAY KINSMAN, *Delegate.*

THE JAMIESON MEDICAL HISTORY CLUB, EDMONTON, ALBERTA, CANADA

1941-1942

The program last year was limited by the fact that many of our members left for active service. There were three dinner meetings with an average attendance of 50 including guests.

March 13th, 1941—Dr. G. N. Ellis, "Development of Renal Surgery."
May 16th, 1941—Dr. D. B. Leitch, "The History of Paediatrics."
Dr. Pustow, University of Illinois, "Development of Surgery of Colon."

Guests at this meeting included physicians attending the "Refresher Course" in Medicine.

November 27th 1941—Mr. Bruce Smith, member of the Bar Association "Marshall and the Development of Jurisprudence" with a discussion of famous medicolegal cases.

You will be interested to know that Dr. Jamieson and I are responsible for the Section of Medical History at the forthcoming C. M. A. convention, the program of which follows:

Section of Historical Medicine

Thursday Afternoon, June 18th: The social history of medicine—a commentary on newer trends. Dr. M. M. Cantor, Edmonton.

William Smellie. Dr. Ross Mitchell, Winnipeg.

The medical sources of Dr. Jekyll and Mr. Hyde. Dr. E. P. Scarlett, Calgary.

Friday Afternoon, June 19th: Dr. Michael Clark. Dr. G. D. Stanley, Calgary.

Jerome Cardan. Dr. H. E. MacDermot, Montreal.

Baron Larrey—Surgeon General to the Army of Napoleon. Dr. A. R. Munro, Edmonton.

The trails of the early doctors in the central prairies. Dr. J. A. Valens, Saskatoon.

The new Executives of the Club:

Hon. President: Dr. H. C. Jamieson
President: Dr. D. B. Leitch
Vice-President: Dr. A. R. Munro
Secretary: Dr. G. Huckell
Treasurer: Dr. Bert Rawlinson
Librarian: Dr. Max M. Cantor
Delegate to Amer. Assoc. His. Med.: Dr. M. M. Cantor.

MAX M. CANTOR, *Delegate.*

JOHNS HOPKINS MEDICAL HISTORY CLUB

1941-1942

During the fifty-second year of its existence, the Johns Hopkins Medical History Club held four meetings. As usual, officers were elected at the first meeting (Dr. Alan C. Woods, President; Dr. George W. Corner, Vice President; Dr. Henry E. Sigerist, Secretary; and Dr. Owsei Temkin, Delegate), and the members of the Johns Hopkins Institute of the History of Medicine talked on various aspects of their work.

For the second and third meetings, speakers from outside had been invited: Mr. John M. Ransom, who talked on "The Beginnings of Hospitals in the

United States"; Professor Richard Shryock, who discussed "Factors Influencing Medical Research in Philadelphia, 1800-60"; and Colonel Edgar E. Hume, who read a paper on "Some Scientific Accomplishments of Army Medical Officers."

The last meeting was held in connection with the Third Graduate Week in medical history, Professor David M. Robinson speaking on "The Excavations of Olynthus."

All the meetings were held in the Lecture Hall of the Institute, and attendance averaged the same as in former years. As customary, the meetings were followed by a short social gathering in the Great Hall of the Welch Medical Library.

OWSEI TEMKIN.

THE MEDICAL HISTORY CLUB OF CHARLESTON, S. C.

1941-1942

The Medical History Club of Charleston has held its usual nine meetings during the past year. The membership has remained the same and the custom of meeting at the homes of the members has been continued.

During the year the Club arranged the removal of the tablet of Dr. Eugene Jagar from the Roper Hospital to the new Clinic of the Medical College of the State of South Carolina.

The program was as follows:

October meeting—Dr. F. E. Kredel's residence. "History of the Present Knowledge of Respiratory Diseases," by Dr. W. H. Kelley.

November luncheon—Fort Sumter Hotel. "Superstitions Among Midwives," by Dr. R. A. Ross of Durham, N. C.

November meeting—Dr. J. F. Townsend's residence. "A Review of the Flexner Biography of William Henry Welch," by Dr. F. E. Kredel.

December meeting—Dr. O. B. Chamberlain's residence. "Samuel Thomson and the Thomsonian System," by Dr. J. H. Hoch.

January meeting—Dr. W. A. Smith's residence. "Personal Recollections of the Reorganization of the Medical College," by Dr. Robert Wilson.

February meeting—Dr. J. S. Rhame's residence. "Clinical History of the Soul," by Dr. D. B. Remsen.

March meeting—Dr. F. B. Johnson's residence. "Medical Caricatures from the Collection of the late Dr. A. Graeme Mitchell of Cincinnati," by Dr. J. I. Waring.

April meeting—Dr. J. van de Erve's residence. "Austin Flint," by Dr. James O'Hear.

May meeting—Dr. F. E. Kredel's residence. "Procrastination," by Dr. Robert Wilson, Jr.

J. I. WARING, *Secretary.*

NEW YORK SOCIETY FOR MEDICAL HISTORY
1941-1942

The New York Society for Medical History which was founded in February, 1939, has completed its third successful season.

The program for 1941-42 was as follows:

October 9, 1941—"The Epidemic Constitution in Historical Review," Dr. Iago Galdston.

November 12, 1941—"The Approaches to Medical History," Professor Richard H. Shryock, University of Pennsylvania.

December 8, 1941—"Hippocratic Ethics in Modern Medicine," Dr. Savas Nittis;

"The History of Arsenic," Dr. Paul E. Bechet.

January 8, 1942—"The Serpent in the History of Medicine," Dr. Arturo Castiglioni.

February 5, 1942—"The Conflict Between Law and Psychological Medicine," Dr. Gregory Zilboorg.

March 5, 1942—"Notable Contributors to the Knowledge of Syphilis," Dr. Herman Goodman.

April 2, 1942—"Dentistry in America up to the Middle of the Nineteenth Century," Dr. Bernhard W. Weinberger.

"Early Concepts of Dental Caries in America," Dr. Louis L. Schwartz.

May 8, 1942—"Nikolai Ivanovich Pirogoff, a Founder of Modern Military Medicine," Dr. Boris M. Fried.

"Florence Nightingale," Dr. Victor Robinson.

The Society has invited students of the five medical schools of Greater New York to submit papers on Medical History. One ten minute paper is to be read by an undergraduate at each of the eight meetings to be held next season. A cash award of at least twenty-five dollars is to be given for the best paper. The Medical schools have shown considerable enthusiasm over this project.

The officers for the session 1941-1942 were

Dr. Edward H. Hume, Chairman.
Dr. George Rosen, Vice-Chairman.
Dr. Edward F. Hartung, Secretary.

CLAUDE EDWIN HEATON.

OHIO COMMITTEE ON MEDICAL HISTORY AND ARCHIVES

1941-1942

The fourth annual session of the Ohio Committee on Medical History and Archives convened on April 1, 1942 in the library of the Ohio Archaeological and Historical Society.

Chairman Jonathan Forman, M. D., Columbus, presided.

The program was devoted to a continuation of the history of medicine in Ohio embraced in the period, 1835-1858.

Attendance at the meeting was an increase over any previous meeting. We were favored with the presence of Dr. and Mrs. Eugene F. Boggs of Indianapolis, Indiana.

Papers were presented as follows:

"Contributions of Ohio Physicians to the Mexican War." Leon Goldman, M. D., Cincinnati, Ohio, Authority on Chemical Warfare.

"The Influence of Samuel Robinson upon Ohio Medical Practice." Philip D. Jordan, Ph. D., Oxford, Ohio, Professor of History, Miami University.

"The Introduction of the Microscope in Ohio." Russell L. Haden, M. D., Cleveland, Ohio, Cleveland Clinic.

"The Formation of the Eclectic School in Cincinnati." Ralph Taylor, M. D., Columbus, Ohio, Past President, Ohio Eclectic Medical Association.

"The Dental Schools of Ohio Between 1835-1858." Edwin C. Mills, D. D. S., Columbus, Ohio, Secretary, Ohio State Dental Society.

"John M. Bigelow, M. D., Early Ohio Physician—Botanist." Adolph Waller, Ph. D., Columbus, Ohio, Professor of Botany, Ohio State University.

"The Thomsonian Recorder of Columbus and Alvin Curtiss, Its Editor." Jonathan Forman, M. D., Columbus, Ohio, Chairman, Ohio Committee on Medical History and Archives.

The papers will be published in the forthcoming October-December issue of The Ohio State Archaeological and Historical Quarterly.

It is planned to continue the exploration of this period in the fifth session in 1943.

HOWARD DITTRICK, M. D.

OSLER SOCIETY OF MEDICAL HISTORY

Oklahoma City, Oklahoma

1941-1942

During the past year the meetings of the Osler Society of Medical History have been less frequent because of the demands of time upon the members of the society in connection with war and civil defense work. The group is continuing with the study of Hippocratic and Greek medicine.

During the past year two of the members of the society have presented papers before the American Association of the History of Medicine. On May 5, 1942, Dr. L. J. Moorman presented a paper on William Withering before the annual meeting of the American Association of the History of Medicine, held at Atlantic City. At the semi-annual meeting of the association, held in Kansas City on October 24, Dr. Bert F. Keltz presented a paper on Medicine Men of the Southwestern Indians.

At the final meeting of the year, to be held the latter part of the month, these papers will be presented before the local society.

BERT F. KELTZ, M. D., *President-Secretary.*

THE PROVIDENCE MEDICAL HISTORY CLUB

1941-1942

The Club has had an interesting year. On May 23, 1941 a group of physicians was invited to the library of the R. I. Medical Society and the collection of incunable and interesting books were demonstrated by members of tne club. This formed a broad outline of the history of medicine from the Edwin Smith Surgical Papyrus to the present day.

On June 25, 1941 the Club was entertained by Dr. Wilfred Pickles with an interesting paper entitled, " Meditationes Medicorum." This was a delightful comparison of the Religio Medici of Sir Thomas Browne, the Confessio Medici of Stephen Paget and the Consecratio Medici of Harvey Cushing.

On November 19, 1941, Mr. Albert E. Lownes entertained the Club and exhibited his excellent collection of books on the history of science, which included a fairly good number of medical books.

On February 21, 1942, Dr. Roland Hammond entertained the Club with a paper on the Badianus Manuscript, an Aztec herbal of 1552. This is the earliest medical book to be published in the Western Hemisphere and was written by native Indian physicians of Mexico. It is illustrated with brightly colored plates of plants used in the treatment of diseases of the new world together with a description and treatment of some surgical diseases.

ROLAND HAMMOND, M. D.

QUIVIRA MEDICAL HISTORY CLUB
1941-1942

The Club organized the Semi-Annual Meeting of the American Association of the History of Medicine which took place in Kansas City, Kansas on October 24-25, 1941. A report of this Meeting was published in the Bulletin, 1941, Vol. X, pp. 701-702. The Club did not engage in any other activities during the year.

LOGAN CLENDENING, M. D.

SECTION ON MEDICAL HISTORY OF THE COLLEGE OF PHYSICIANS, PHILADELPHIA
1941-1942

The Section on Medical History of the College of Physicians of Philadelphia presents this Report as a Constituent Member of the American Association.

Meetings were held from November to April. Programs were well arranged and the Essays excellent; certain of them treated on military subjects. Of special note is to be mentioned that by Colonel Edgar Erskine Hume of the Field Service School at Carlisle, who came as a guest to tell of the scientific contributions and measures relating to Public Health of surgeons in the United States Army from the earliest days of the organization.

The roll has been about 45, but the attendance has greatly fallen off as many of the Fellows of the College are actively engaged in or their attention has been diverted by the insistent call to 'Defense' matters.

It has been deemed wise to reduce the number of meetings in the coming year pending the expected absence of so many Fellows while the 'Duration' continues.

As it has been the custom of the Sections of the College to limit the term of service of their officers, for the ensuing year, Dr. Louis Laplace was elected Chairman and Dr. William G. Leaman, Jr., Clerk, the retiring chairman continuing his interest by being included on the Executive Committee.

BURTON CHANCE, *Delegate.*

SECTION ON THE HISTORY OF MEDICINE OF THE RICHMOND ACADEMY OF MEDICINE

1941-1942

The Section on the History of Medicine of the Richmond Academy of Medicine held its annual Walter Reed night on March 10th. Eighty-two, including guests, members of the Section and their ladies attended the dinner in the banquet hall. Officers of the Section for the ensuing year were elected. They are Dr. W. Lowndes Peple, Chairman; Dr. Harry J. Warthen, Vice-Chairman; Dr. Charles L. Outland, Secretary-Treasurer. Drs. George W. Corner and Walter E. Vest were elected honorary members. The Section now has 77 ordinary members and 10 honorary members.

Between the dinner and the time for the regular meeting of the Academy an exhibit of obstetric illustrations showing the changing ideas of the anatomy of the female generative organs and of the position of the fetus in utero together with illustrations of obstetrical instruments and operations, was open for inspection.

The meeting of the Academy of Medicine was called to order by the President, Dr. Beverly R. Tucker, who turned the meeting over to the Chairman of the Section on the History of Medicine. Dr. Joseph Lyons Miller of Thomas, West Virginia, presented the Academy with a pewter ink stand and sand box which originally belonged to Dr. Jesse Bennett; a nursing bottle with pewter nipple; the medical papers published by Dr. John Esten Cooke while he was professor of medicine at Transylvania University; and two inaugural theses of Virginia students at the University of Pennsylvania prior to 1810. This makes a total of 44 theses of Virginia students in the Miller Library which is probably the largest collection of Virginia theses anywhere to be found. Dr. M. Pierce Rucker presented a reprint of a letter of Mr. John Clayton of Crofton at Wakefield in Yorkshire to the Royal Society, May 12, 1688, giving an account of "Several Observables in Virginia and in his Voyage Thither . . . . Washington, 1844."

Mr. P. A. Wilhite a grandson of Dr. P. A. Wilhite, who was a student of Crawford W. Long and who played such an important part in the history of anesthesia, was present and gave to the Academy numerous papers and documents concerning the first surgical operation under anesthesia. Among these papers is a receipted bill and note in J. Marion Sims' handwriting and a letter from H. Marion Sims which throws an interesting side light on the controversy between his illustrious father and Drs. Emmet, Thomas, and Peaslee. It was J. Marion Sims who first recognized the priority of Crawford W. Long's operation and it was Dr. P. A. Wilhite who first directed Sims' attention to it.

Dr. W. Lowndes Peple gave a very graphic description of the discovery of anesthesia just 100 years ago, and of the ether frolics that preceded it. Dr.

Walter E. Vest of Huntington, West Virginia, gave us a picture of medicine in the time of Shakespeare under the title "The Doctor Looks at Falstaff." He made the lovable old reprobate live again for us and to die in a characteristic medical manner of a number of possibilities but with the final diagnosis held in reserve.

Dr. George W. Corner carried us back still further in time, with his discussion of "Medicine in the Poems of Chaucer" with illustrations, which were greatly enjoyed. In this instance the doctor of the XIV century, and not the patient, lived again for an all too brief period.

Following these papers the meeting was adjourned.

M. Pierce Rucker, M. D.

SOCIETY OF MEDICAL HISTORY OF CHICAGO

1941-1942

Owing to the multiplicity of meetings, of special societies, the Society of Medical History has found it difficult to get a suitable time for holding its meetings.

A meeting was held on January 27, 1942, and papers were presented by Dr. Stewart C. Thomson on "The Surgeon-Anatomists of Great Windmill Street," and by Dr. Leo M. Zimmerman on "The Evolution of Blood Transfusion."

A joint meeting has been arranged for the coming fall with the Institute of Medicine of Chicago.

Ernest E. Irons.

THE WALTER JARVIS BARLOW SOCIETY OF THE HISTORY OF MEDICINE

Los Angeles, California

1941-1942

The officers for the year 1941-42 were elected on March 31, 1941, as follows:

President: Dr. Elizabeth Mason-Hohl
Vice-President: Dr. G. R. Owen.
Secretary-Treasurer: Dr. Hyman Miller.
Librarian: Mrs. Mary E. Irish.
Program Chairman and Editor: Mr. William White.
Delegate to the American Association of the History of Medicine: Dr. Fred Norwood.

In the course of the year, since the last annual report, the following programs have been presented before the Society:

"The History of Cocaine," by Dr. Clinton Thienes.
"Roman Medicine," by Dr. James H. Cryst.
"Physical Examination in Ancient Times," by Dr. W. N. Anderson.
"The Rise of Physical Diagnosis," by Dr. S. G. McCool.
"The Decline of Physical Diagnosis," by Dr. A. E. T. Rogers.
"The History of the Development of Blood Typing in Relation to Non-Paternity and Some Historical Notes on Hemophilia," by Dr. Carol Le Fleur Birch.
"The History of Surgical Instruments," by Dr. H. E. Schiffbauer.

Owing to the entry of the United States into the war and the consequent destruction of many of our ordinary medical activities the Society thought it advisable this year to postpone the Annual George Dock lectureship usually given on Dr. Dock's birthday.

In the course of the year Mr. William White resigned as program chairman and editor and the Society's Board appointed Dr. Fred Norwood in his place.

HYMAN MILLER, *Secretary.*

THE WILLIAM WELCH SOCIETY OF NEW YORK UNIVERSITY COLLEGE OF MEDICINE

1941-1942

It is a pleasure to be privileged to report to you concerning the activities of the William Welch Society in its thirteenth year. As a matter of fact, however, the pleasure is not as great as I had anticipated. I had looked forward to being able to present to you a glowing report of increased student participation in the study of medical history, but unfortunately I can not. The vast majority of students seem to care very little about the history of their profession.

This apathetic attitude has been accentuated by the war. I can appreciate Mrs. Roosevelt's feelings when she discovered that dancing is one cultural activity which suffers in wartime. There are others as well, as we of the William Welch Society have come to realize.

It was not that we fell down on the job. Our activities and our program maintained the high standards set by our predecessors, yet the reception among the students was chilly, if not cold. They seemed to be too busy with personal problems arising out of the war. Should one join the Army—or should it be the Navy? Where was one to obtain funds ordinarily earned during summer vacations? What kind of an internship would one get? These and other questions monopolized the conversation. They were important and not to be lightly cast aside.

Besides these preoccupations, there was a psychological factor, I believe. During wartime we become accustomed to excitement, but in so doing we crave more and more—like a type of drug addiction. To misquote Lenin "war is the opiate of the masses" (Of course there is nothing like being lulled to sleep by a slight case of lead poisoning). To most students, medical history is not exciting enough to compete with the latest headlines.

Because of these factors, we are thankful that a mere handful—about fifteen of us—were actively engaged in our program and endeavored to keep aglow the dying embers of intellectual curiosity remaining in the student body. Our program for 1941-1942:

Dr. Edward H. Hume, "William H. Welch as a Personal Friend."
Dr. Milton I. Roemer, "Historical Relations of War and Medicine."
Dr. Herman Goodman, "History of Syphilis."
Dr. Wade W. Oliver, "Life of William H. Park."
Dr. Gregory Zilboorg, "Historical Relations of Psychiatry to Medicine."
Dr. Victor Robinson, "History of American Military Medicine."
Dr. Arturo Castiglioni, "Galileo."
Dr. George Rosen, "History of Naval Warfare."
Dr. Henry Meleney, "Life of Sir Patrick Manson."
* Dr. Philip D. Wilson, "War Surgical Experiences."
** Dr. Simon Flexner, "Life of William H. Welch."

We do not chastize our fellow students for their lack of interest—they must first be exposed to the lure of medical history before they become infected with the virus which has so permanently established itself in our cerebral hemispheres. We think that we can bring about this exposure and our hope is that the incubation period is short. Certainly those students who attended our seminars this year found that the inoculation took!

We think that the study of medical history, its socio-economic aspects and its culture, is of particular importance now, because the cultural values that are so essential to us in the medical profession are the very values we are fighting to achieve in winning the war and a lasting peace.

The freedom of investigation and the freedom of unhampered study have been the goals of medicine through the ages, and the effects of enlightened men to achieve these goals illuminate the pages of medical history.

When medical students realize this, they will take up the study of medical history not alone for its intrinsic cultural value, or for the development of a proper perspective, or for the many hours of pure enjoyment to be derived, but for the lessons to be learned by democratic citizens of a democratic world fighting to excise a rodent ulcer which is attempting to destroy the face of the world.

HAROLD LIEF, *President.*

* Annual joint meeting with the College Medical Society.
** By special invitation to attend a staff meeting at the Rockefeller Institute.

MEETING OF THE COUNCIL

SUNDAY, MAY 3, 1942

Hotel Chalfonte, Roberts Room

DR. JABEZ H. ELLIOTT, Presiding

Dr. Elliott called the Meeting to order and welcomed the forty-five members of the Council and members of the Association attending the meeting. He pointed out that only members of the Council had a vote, but that the Council wished all members present to take an active part in its deliberations and welcomed their advice.

I. REPORTS OF THE OFFICERS

1. *Report of the Secretary*

During the year 1941, the total membership of the Association decreased by 3 members from 434 to 431. This was primarily due to the resignation of members who, during the year, joined the armed forces but was also due to the fact that fewer new members were admitted than in the preceding years. During 1941, the Association lost 11 members through death and 19 through resignation. Four were dropped for non-payment of dues. It elected 21 active members, 2 corresponding members, 3 honorary members, and 1 constituent society—a total of 27. The new constituent society is the Jamieson Medical History Club at the University of Alberta in Edmonton, Canada which was elected to membership at the last Annual Meeting. This brings the total number of constituent societies to 20.

From January to April, 1942 resignations continued to be received as a result of the war. The Association lost 2 members through death and 12 members through resignation, while it admitted 12 active members and 1 corresponding member during that period. Members who resigned on account of the war are considered dormant members. Their names are kept in a special file and they all will be approached after the war and invited to resume their active membership. Including the number of members who will come up for election today, the total membership is at the moment 433 or 2 more than on January 1, 1942 and only 1 less than on January 1, 1941 when we had our largest membership. Considering the unusual times in which we live, we have not fared so badly but we must count with further resignations and new members would therefore be most welcome.

In accordance with a decision of the Council, 4 members were dropped for non-payment of dues for a period of over 2 years and the sending of the Bulletin was discontinued to members who, in spite of repeated warnings, had failed to pay their dues for one year. This affected 17 members but we still hope that some of them will pay up so that we can keep them as active members.

During the year 1941, the Association held two meetings, the Seventeenth Annual Meeting in Atlantic City on May 4-6 and the Fall Meeting in Kansas City under the auspices of the Quivira Medical History Club with Dr. Logan Clendening as chairman.

Discussion

Secretary: The question of members who have joined the armed forces is not yet solved satisfactorily. Some of them continue their membership, pay dues and receive the Bulletin. Others have resigned formally, while still others have left without informing us and are not paying dues. It would be advisable to pass some resolution on the subject. Some of our members are serving in military hospitals in the country, are able to pay dues and anxious to receive the Bulletin. We had a number of letters to this account. The status of such members will obviously not be affected. Others, however, are serving in foreign countries, are unable to pay dues and do not care for the Bulletin at the moment. Shall we accept their resignation or shall we keep them as members? I think we should. We should relieve them of all dues and obligations while not sending them the Bulletin for the duration of the war.

Dr. Krumbhaar: I move that members inducted into military services, who so desire, shall be considered members in good standing, relieved of all dues and obligations for the duration of the war.

Dr. Krumbhaar's motion duly seconded was carried and the Secretary was requested to inform members of the decision.

2. *Report of the Treasurer for the Year 1941*

Balance on hand January 1, 1941		$1,073.47
Receipts		
1940 dues for 12 members at $5.00	$60.00	
1941 dues for 373 members at $5.00	1,865.00	
1941 dues for 1 Canadian member	4.26	
1941 dues for 1 Hawaiian member	4.60	
1941 dues for 20 Constituent Societies at $10	200.00	
1942 dues for 1 member at $5.00	5.00	
Interest (Canadian deposits)	.01	
Total Receipts		$2,138.87
		$3,212.34*

* Of which $24.86 are deposited in the Bank of Nova Scotia, Spadina, Ontario by Dr. J. H. Elliott.

DISBURSEMENTS

Expenses of Atlantic City meeting		
Check No. 79, May 6	$77.00	
" " 80, May 27	23.47	
" " 81, May 27	32.25	
" " 82, May 27	11.00	
" " 86, May 27	2.00	
" " 92, Sept. 27	1.90	147.62
Honorarium for Garrison lecture		
Check No. 78, May 5		100.00
Expenses of Kansas City meeting		
Check No. 95, Oct. 8	31.25	
" " 96, Oct. 8	6.30	37.55
Subscriptions to Bulletin of the History of Medicine		
Check No. 76, April 29	1,324.00	
" " 99, Nov. 14	296.00	1,620.00
Printing and stationery		
Check No. 67, Feb. 1	2.40	
" " 70, April 23	115.23	
" " 71, April 23	18.10	
" " 72, April 23	8.25	
" " 85, May 27	3.25	
" " 89, July 24	24.10	
" " 90, July 30	14.25	
" " 91, Sept. 27	2.75	
" " 97, Oct. 14	19.38	
" " 98, Nov. 13	3.30	
" " 101, Dec. 9	9.40	
" " 102, Dec. 16	12.25	232.66
Petty Cash		
Check No. 65, Feb. 1	10.00	
" " 69, April 8	25.00	
" " 75, April 29	20.00	
" " 87, July 9	25.00	
" " 88, July 24	3.24	
" " 93, Sept. 30	30.00	
" " 100, Nov. 15	1.93	115.17

Osler Medal		
Check No. 66, Feb. 1	4.00	
" " 68, April 8	200.00	
" " 73, April 23	3.00	
" " 74, April 29	4.65	
" " 83, May 27	5.63	
" " 94, Oct. 1	320.16	537.44
Diplomas for Honorary members		
Check No. 84, May 27		3.75
Clerical and bookkeeping assistance		
Check No. 77, April 29		10.40
Bank collection charge (Canadian deposits)		.15
TOTAL DISBURSEMENTS		$2,804.74
BALANCE ON HAND DEC. 31, 1941		$407.60

DISCUSSION

TREASURER: Eight members have not paid dues since 1940. At least three letters have been written to them every year but they had not even the courtesy to answer. I therefore move that these eight members be dropped from the membership list. Nine members have not paid dues for 1941. We discontinued sending them the Bulletin, but still hope that they will pay up so that we can keep them as members.

Upon motion of the Treasurer duly seconded, the Council decided to drop the eight defaulting members and requested the Secretary to inform them of the decision.

TREASURER: Members have paid subscriptions to the journals *Aesculape* and *Janus*. Checks sent to the publishers were never cashed and we never had any response. Shall the money be returned to members?

DR. KRUMBHAAR: We may be able to complete our files later and it therefore may be advisable for the Treasurer to hold the subscription money for another year.

Upon motion by Dr. Krumbhaar duly seconded, the Council decided that the Treasurer should hold the subscriptions until further action is taken.

The Treasurer expressed his appreciation to Miss Genevieve Miller who, during the past year, has done practically all the Treasurer's work.

3. *Report of the Editor*

Since the Bulletin of the History of Medicine was becoming very bulky, it was decided to publish two medium-size volumes every year instead of one unduly large volume. This was done for the first time in 1941 when volumes IX and X were issued. Volume IX had 607 pages and Volume X had 729 pages, a total of 1336 pages. The two volumes together contained:

37 main articles
8 texts and documents
15 notes and comments
16 reports on medico-historical news and activities
135 illustrations

The various articles were contributed by 35 members and 18 non-members of the AAHM.

Of materials especially concerning the Association, the Bulletin published the following:

1. A report on changes in the membership during 1941 (Vol. IX, pp. 113-117).
2. A report of the Fall Meeting of the AAHM in Cleveland, Ohio (Vol. IX, pp. 221-236).
3. Reports on the collections of Osleriana at the University of California and of the historical collections of B. W. Weinberger in New York (Vol. IX, pp. 332-336).
4. A report on medical history in Central and South America (Vol. IX, pp. 342-360) of which a Spanish translation was made by our honorary member, Professor Juan Ramón Beltrán and was published in the fifth volume of the " Publicaciones de la Cátedra de Historia de la Medicina," 1942, pp. 161-191.
5. Bibliography of the History of Medicine in the United States and Canada—1940 (Vol. IX, pp. 436-467).
6. Transactions of the Seventeenth Annual Meeting (Vol. X, pp. 113-416).
7. Announcements of the Association and its constituent societies in almost every number.

Volume XI is in course of publication. A new list of members brought up to date was published in the January number (pp. 90-111) and the Bibliography of the History of Medicine in the United States and Canada for 1941 has just been issued in the May number.

In 1941, the financial status of the Bulletin was the following:

Receipts:

Subscription of members of the AAHM.....	$1,620.00
Subscriptions to the Johns Hopkins Press.....	1,226.75

Sale of back numbers	128.42	
Contribution of the Johns Hopkins Institute of the History of Medicine	3,532.14	$6,507.31

Expenditures:

Printing and binding of Volumes IX and X	$6,098.71	
Commission to Press (15%)	408.60	$6,507.31

The cost per page including illustrations and foreign type was $4.87. Since 1,100 copies were printed, the cost for the two volumes amounted to $5.91.

The Bulletin is still published at a considerable loss and this makes it impossible to increase it still further. I must try to keep within the limits of 1,200 pages a year or 600 pages a volume. At the moment, I have enough manuscripts on hand to fill the next two volumes of the Bulletin. This shows that the *Annals of Medical History* and the *Bulletin of the History of Medicine* are not enough to serve the entire English-speaking world. England has no periodical devoted to medical history besides the *Proceedings of the Royal Society of Medicine, Section of the History of Medicine* which, however, publishes only a few pages every year. In the past year, the Bulletin published several articles of British scholars and several other manuscripts from Britain have been accepted for publication.

As I explained last year, the chief difficulty is with the medium-size studies which are too long for a journal and not long enough for a monograph. I then planned a series of *Supplements to the Bulletin* that would take care of the overflow and particularly of such long articles. The plan was explained in the June number of 1941 and all members of the Association and other subscribers to the Bulletin were invited to subscribe to such Supplements if the plan should materialize. I explained that such a series could only be undertaken if it could count on 300 subscribers but unfortunately only 181 or less than 200 endorsed the plan so that it had to be abandoned, at least for the time being. But this leaves an acute problem still unsolved.

It seems to me that there is another possibility that should be considered and discussed today. Several large manuscripts have been submitted to me, for which the author was willing to pay the entire or at least part of the cost of printing; in other cases grants-in-aid-of-publication could be secured from foundations. We could therefore establish a series of *Studies in the History of Medicine* in which we could publish monographs for which funds could be secured. We could perhaps make a contract with a publisher according to which he would contribute 20% of the total cost while the balance would be provided by the author or from foundations. Our ultimate aim should be to secure a certain amount of money as a revolving fund.

Discussion

An informal discussion was held about the possibility of publishing a series of monographs. The Editor explained the advantages and limitations of such a plan. A monograph accepted by the Association and published under its auspices as part of a series would have a better sale than if it were published independently. On the other hand, we would be limited in our choice by the present lack of funds so that only those books could be accepted for publication which meet with the approval of the Association and for which funds could be secured. The Research Committee of the Association could serve as Editorial Board to accept or reject publications.

Dr. Krumbhaar moved that the Association consider the establishment of a series of *Studies in the History of Medicine*, that the Editor be requested to take up the matter with suitable publishers and to report to the Executive Committee.

Dr. Krumbhaar's motion, seconded by Dr. Dittrick, was carried.

II. Reports of the Committees

1. *Report of the Executive Committee of the Council*

The Executive Committee consisting of President, Secretary, Editor and Treasurer, ex officio, and of Doctors Dittrick, Kiser, Krumbhaar, and Middleton transacted all business affairs of the Council in the interval between the Annual Meetings. Its chief function was the monthly election of new members.

Henry E. Sigerist, *Secretary*

The report of the Executive Committee was adopted by the Council.

2. *Report of the Fielding H. Garrison Lecture Committee*

After having surveyed the field the Committee unanimously recommends that the Council extend an invitation to Dr. William S. Middleton to deliver the Fielding H. Garrison Lecture for 1943.

Dr. Middleton is a past president and very active member of the Association and the Committee could not think of a better choice.

Henry E. Sigerist, *Chairman*

After having heard the recommendation of its Committee, the Council unanimously decided to extend an invitation to Dr. William S. Middleton to deliver the Fielding H. Garrison Lecture for 1943.

3. *Report of the Committee on Medals*

In the absence of the chairman, Dr. Walter R. Steiner who in a letter extended his greetings to the Association, the Secretary presented the following report:

In the summer of 1942, the Committee sent an announcement of the Osler Medal to all medical schools of the United States and Canada and to all teachers of medical history inviting them to submit their best student essays.

Five essays were received from students of four medical schools. One was disqualified because it had already been published in a student journal, another because it had been written for another contest.

After careful consideration, the Committee recommends that the Osler Medal be awarded to Mr. John T. Barrett of Boston University, School of Medicine for his essay, "The Inoculation Controversy in Puritan New England." The essay is based on the investigation of contemporary sources and constitutes an original contribution to the history of medicine. The Committee also recommends that the essay be published in the Transactions of the Association.

Discussion

The Council endorsed the decision of the Medal Committee to grant the William Osler Medal for 1942 to Mr. John T. Barrett and decided to have his essay published in the Transactions of the Association.

Secretary: I would like to move that the Council consider an amendment to the By-Laws. Article 2 of the present By-Laws foresees: "The Medal shall be granted to undergraduate or graduate students of the universities of the United States and Canada. . . ." Every year dissertations are written on subjects of medical history by candidates for the Ph. D. in history or sociology. Since the historical scholarship of students of history is likely to be greater than that of students of medicine, the Association might have to grant the Medal more often to students of history than to medical students. The intention of the Medal, however, undoubtedly is to stimulate interest in medical history among students of medicine.

The motion led to a considerable debate in which Doctors Elliott, Krumbhaar, Shryock, Temkin, Rosen, Chance, Weinberger and Sigerist participated. Some members were of the opinion that the Medal should be open for competition not only to students of medicine but also to students of veterinary medicine and students of dentistry. An amendment to this effect brought forward by Dr. Krumbhaar and seconded by Dr. Shryock was defeated, however, and *the Council voted to grant the Medal to students of medicine. The By-Laws will be changed accordingly at next year's annual meeting.*

Dr. Sigerist: I feel that the establishment of the William H. Welch Medal as foreseen by Constitution and By-Laws would be highly desirable. The Osler Medal was established, thanks to a generous contribution made by Mr. Marshall Field. This fund is now exhausted but since the verso of the Osler Medal could also be used as verso of the Welch Medal the total cost would not exceed $400. I think that an effort should be made to raise this amount and, as a matter of fact, several pledges amounting to almost one hundred dollars have already been received.

This suggestion also led to a considerable discussion in which Doctors

Elliott, Krumbhaar, Long, Chance, Zilboorg and Sigerist participated. Some members felt that the times were inopportune for the establishment of a new medal. Dr. Larkey, however, drew the attention of the Council to the fact that it already had established the Medal at its last year's meeting; whereupon the Council decided that the Medal should be executed as soon as funds would permit.

4. *Report of the Committee for Revision of the Constitution and By-Laws*

The Committee recommends the following amendment:

To Article 5. Honorary Members. Second paragraph. To add:

> Names of proposed candidates for Honorary Membership must be submitted in writing to the Council at least a month before the Annual Meeting.

The amendment is in line with a decision of the Council taken at the last Annual Meeting and intends to protect the Council against nominations from the floor which cannot be refused without embarrassment.

DR. JABEZ H. ELLIOTT, *Chairman*

The Council endorsed the Committee's report and decided to recommend the amendment to the Annual Meeting.

5. *Report of the Committee on Relations with Central and South America*

DR. LONG called attention to the development of studies on the history of medicine in Argentina, Peru and Guatemala. In Argentina Professor Juan Ramón Beltrán has developed an active school. Two journals are published, the *Revista Argentina de Historia de la Medicina*, the first number of the first volume of which was published in January, and the *Publicaciones de la Cátedra de Historia de la Medicina* of which five volumes have been published so far. Professor Beltrán recently gave two series of lectures at the National University and the School of Medicine in Rio de Janeiro. In Peru, under the leadership of Prof. Enrique Paz Soldan, the *Sociedad Peruana de Historia de Medicina* is a vigorous association. The *Anales* of this society are now in their fourth volume. This journal is a rich source of material on the period of the conquest. A notable contribution from Guatemala is *Las Ciencias Medicas de Guatemala, Origen y Evolución*, by Prof. Carlos Martínez Durán. This is an excellent book rich in information on the early history of medicine in Central America. Dr. Long made short comments on the interest in medical history in other Latin American countries.

DR. ZILBOORG: While Brazil has no separate medical history society, yet there is considerable interest in the subject. The Academy of Medicine and other medical groups are all very interested in medical history, and do a good deal of research. When they need special advice, they invite Professor

Beltrán to come from Buenos Aires. It would be advisable for our Association to establish relations with Brazil.

Dr. Long urged our members to send their publications to our Latin American colleagues who will greatly appreciate them.

6. *Report of the Committee on Research on the History of American Medicine*

The Committee has had under its general oversight, during the past year, the preparation of the annual Bibliography on the History of American Medicine for publication in the *Bulletin*. The actual work, however, has been ably and conscientiously performed by Miss Schramm and her associates in collecting materials, and by Miss Miller in assembling and editing the same. As this project is largely an independent unit, it is suggested that the group involved be constituted a separate Committee, or a Sub-Committee analogous to that on the History of Psychiatry. We feel that the Bibliography prepared this year is more comprehensive and the classifications more adequate than in previous years, though no one would claim perfection in either respect. Improvement in the convenience and consistency of editorial forms has also been achieved. It is hoped that members of the Association throughout this country and Canada are finding the Bibliography of increasing usefulness.

The Committee met at the Institute of Medical History in Baltimore on February 2, 1942, and appreciated the hospitality shown it on that occasion by Dr. Sigerist and members of the staff. Dr. Blanton, Dr. Galdston, Dr. Sigerist and Dr. Shryock attended. A general discussion ensued on ways and means of encouraging and directing local and state activities relating to American medical history. Dr. Galdston pointed out that local organizations sometimes need information on how to plan meetings as well as on how to conduct actual research, and suggested that the Committee might prepare and publish a manual covering both these phases of local activities. Dr. Galdston was therefore requested and agreed to prepare a paper, on the activities of local medical societies, for publication in the *Bulletin*, and with a view to its possible later elaboration in the form of a manual which could serve as a guide to such societies. Dr. Galdston's paper is to include specific suggestions with relation to such matters as conduct of meetings, selection of speakers, publication and subjects of research.

Dr. Blanton pointed out that numbers of state histories were being prepared, and that those active in such programs might also profit by suggestions from this Committee. In line with this thought, the Committee approved Dr. Sigerist's suggestion that in addition to Dr. Galdston's article, three others be prepared on the following topics:

1. What state histories should include.
2. The teaching of medical history.
3. Collecting materials for medical history.

All of these can subsequently be bound together, and this would constitute the desired Manual. Meanwhile, information can be sought as to which states are the subjects of historical studies now in preparation, and reprints of the above articles can be sent to appropriate mailing lists.

There was, in addition, some discussion of whether the Committee should encourage particular lines of research, and also of possible ways of raising funds for the publication of monographs; but no action was taken in these matters.

RICHARD H. SHRYOCK, *Chairman*

7. Report of the Sub-Committee of the History of Psychiatry

The Subcommittee on the History of Psychiatry has this to report on the progress of the plans which were outlined at last year's meeting.

The chairman of the Subcommittee was appointed chairman of the Committee on the History of Psychiatry of the American Psychiatric Association, consisting of the following members:

DR. EARL D. BOND (Philadelphia)
DR. CLARENCE B. FARRAR (Toronto, Canada)
DR. CLEMENTS C. FRY (New Haven)
DR. HUGH C. HENRY (Richmond)
DR. WILLIAM C. MENNINGER (Topeka)
DR. GREGORY ZILBOORG (New York)

As will be recalled, the task of the Subcommittee was to cooperate with the corresponding Committee of the American Psychiatric Association in the plan for the writing and publication of a history of American psychiatry for the past century, this history to serve as a centenary volume on the occasion of the forthcoming centenary of the American Psychiatric Association in 1944.

Your Subcommittee proved extremely helpful in this task and the outline of the volume is now complete and all but three chapters have been assigned to definite authors who have accepted the task. The list of chapters is as follows:

Chapter One (25 printed pages): The Beginnings, from the Colonial Days to the Foundation of the American Psychiatric Association. Author, Professor Richard Shryock.

Chapter Two (25 pages): General European Background at the Time the American Psychiatric Association was founded. Author, Dr. Henry E. Sigerist.

Chapter Three (25 pages): The Foundation and the Founders of the Association. Author, Dr. Winfred Overholser.

Chapter Four (50 pages): The History of American Institutions for the Mentally Ill. Author, Dr. S. W. Hamilton.

Chapter Five (50 pages): The American Psychiatric Literature for the Past One Hundred Years. Author, Dr. Henry Alden Bunker.

Chapter Six (50 pages): The History of Psychiatric Research in America. Author, Dr. John Whitehorn.

Chapter Seven (50 pages): The History of Psychiatry as a Specialty (the history of psychiatric education, including nursing, education, and psychiatric social work.) Author not yet chosen.

Chapter Eight (50 pages): Legal Aspects of Psychiatry, development through the past one hundred years. Author, Dr. Gregory Zilboorg.

Chapter Nine (50 pages): A History of Therapy, Intra- and Extramural, in America. Author not yet known.

Chapter Ten (50 pages): The History of Mental Hygiene. Author, Albert Deutsch.

Chapter Eleven (20 pages): A Century of American General Psychology and its Relationship to Psychiatry. Author, Professor J. F. Brown.

Chapter Twelve (20 pages): The Influence of Psychiatry on Social Sciences for the Past One Hundred Years. Author not yet chosen.

Chapter Thirteen (20 pages): The Influence of Psychiatry on Anthropology for the Past One Hundred Years. Author, Professor Clyde Kluckhohn.

This list is yet to be approved by the Council of the American Psychiatric Association at their forthcoming meeting in May in Boston. There is little doubt that their approval will be given. This Association's endorsement of the plan is hereby solicited.

The physical appearance of the book engaged considerable attention. Mr. Melvin Loos of New York is to design the volume, and the Columbia University Press is to publish it. The contract for publication was signed by the President of the American Psychiatric Association on April 28th. The book will appear in May, 1944. Manuscripts are to be completed in September, 1943.

Throughout this year of planning the members of your Subcommittee could not have been more cooperative, and their advice could not have been more enlightening and helpful.

The Association will be interested in the fact that the sum of three thousand five hundred dollars was donated for the publication of the book. Of this amount, twenty-five hundred dollars are to be paid to the Columbia University Press as part of the publication expenses. The remaining expenses are to be defrayed by the Press. An excellent half-rag paper was obtained for the production of the book. The donor of the three thousand five hundred dollars stipulated that any money that might be left or might accrue from the sale of the book is to be especially earmarked by the American Psychiatric Association to be used for furthering research in psychiatric history.

The book will be offered at the subscription price of four dollars to members of this Association and the American Psychiatric Association, and at four dollars and fifty cents to non-members of these Associations.

It is of interest, we are sure, to report that the Committee on the History

of Psychiatry intends to solicit the Council of the American Psychiatric Association for authorization of the assignment of four pages of each issue of the *American Journal of Psychiatry* for the special purposes of reviewing old psychiatric books and texts.

GREGORY ZILBOORG, *Chairman*

DR. ZILBOORG: I should like to raise the question whether the Committee of the History of Psychiatry of the American Psychiatric Association could not become a constituent member of the Association. If this could be done, I shall recommend it to the Association at their Boston meeting.

DR. SIGERIST: According to the Constitution, any organization in the United States and Canada having a purpose similar to that of the Association shall be eligible as a constituent society. The Committee on the History of Psychiatry therefore would certainly be most welcome.

IV. APPOINTMENT OF AUDITORS BY THE PRESIDENT

Dr. Jabez H. Elliott appointed Dr. Chance and Dr. Dittrick as auditors of the Treasurer's Report, to examine the books and report at the Annual Meeting.

V. REPORTS OF THE CONSTITUENT SOCIETIES

Reports of the twenty Constituent Societies were read, either by the delegates or in their absence by the Secretary. They are published on pp. 411-426.

V. ELECTIONS

1. *Constituent Societies*

The following application for membership as constituent society had been received from the *Beaumont Medical Club of Connecticut*:

The Beaumont Medical Club of Connecticut, through its Secretary, wishes to make application for membership in The American Association of the History of Medicine. The Beaumont Medical Club was organized in 1920. The active membership is limited to thirty members and the honorary membership to twenty-five. Meetings are held at regular intervals throughout the year, usually four in number, and, in addition, the Club sponsors The Beaumont Lectureship on the History of Medicine, established by the will of Dr. William H. Carmalt in 1929. Since its inception one hundred twenty papers have been presented before the Club, most of which are to be found in the Proceedings of the Club now on file at the Yale Medical Library, and many of which have been published in various journals. The Club usually meets in The Beaumont Room of the Yale Medical Library. Within recent months the Club has presented to the Yale Medical Library a portrait of Dr. William

Beaumont, painted by Mr. Deane Keller of the Yale School of Fine Arts. The Club possesses a collection of medical memorabilia with numerous Beaumont items, which include a number of letters. The Club has also been active in memorializing Dr. William Beaumont and through their efforts a memorial boulder has been placed on the Lebanon green and one of the state highways has been named in honor of Dr. William Beaumont. In the new volume entitled "The Heritage of Connecticut Medicine," published by the Connecticut State Medical Society, thirteen of the nineteen chapters have been written by members of The Beaumont Medical Club.

The application was received very enthusiastically and the Beaumont Medical Club of Connecticut was unanimously elected a constituent society which brings our number of constituents to 21.

2. *Active Members*

A list of six applicants duly nominated by active members of the Association was read and all applicants were unanimously elected to active membership.

3. *Nomination for Honorary Membership*

Upon nomination by the *Committee on Relations with Central and South America*, the Council unanimously decided to recommend to the Annual Meeting the election of Professor Carlos Martínez Durán to honorary membership. Professor Martínez Durán is one of the most distinguished medical historians of Latin America. He is professor at the Universidad de San Carlos in Guatemala and has just published a monumental book, *Las Ciencias Médicas en Guatemala Origen y Evolución*.

VI. Meetings

In view of the increasing difficulties with transportation, the Council decided not to hold a Fall Meeting this year.

The *Annual Meeting of 1943* will be held in Atlantic City on May 2-4, if conditions permit.

An invitation was received from Dr. John F. Fulton to hold the *Fall Meeting of 1943* in New Haven and to devote it to the commemoration of the 400th anniversary of the publication of Vesalius' *Fabrica*. The invitation was unanimously accepted and the Council decided to hold the Fall Meeting of 1943 in New Haven where the Historical Library of the School of Medicine with the Harvey Cushing collection will give an ideal background for such a celebration.

The meeting was adjourned at 5:50 p. m.

COMMITTEES OF THE COUNCIL

Dr. Elliott re-appointed the following Committees:

1. *Fielding H. Garrison Lectureship Committee*
   HENRY E. SIGERIST, Chairman
   W. B. MCDANIEL, 2ND
   E. B. KRUMBHAAR
2. *Committee on Medals*
   WALTER R. STEINER, Chairman
   JABEZ H. ELLIOTT
   ESMOND R. LONG
   E. B. KRUMBHAAR
   HENRY E. SIGERIST
3. *Committee for Revision of Constitution and By-Laws*
   JABEZ H. ELLIOTT, Chairman
   HENRY R. VIETS
   HENRY E. SIGERIST
4. *Committee on Relations with Central and South America*
   ESMOND R. LONG, Chairman
   LOGAN CLENDENING
   HENRY E. SIGERIST
5. *Committee on Research in the History of American Medicine*
   RICHARD H. SHRYOCK, Chairman
   IAGO GALDSTON
   WYNDHAM B. BLANTON
   HOWARD DITTRICK
   HENRY E. SIGERIST

a. *Sub-Committee on the Bibliography of Medical History in the United States and Canada*
   RICHARD H. SHRYOCK, Chairman
   GENEVIEVE MILLER
   W. W. FRANCIS
   EVA HAWKINS
   EDGAR ERSKINE HUME
   MORRIS C. LEIKIND
   ELIZABETH E. SCHRAMM
   GEORGE URDANG
   BERNHARD W. WEINBERGER

b. *Sub-Committee on the History of Psychiatry*
   GREGORY ZILBOORG, Chairman
   ALBERT DEUTSCH
   HENRY E. SIGERIST
   RICHARD H. SHRYOCK, Ex-officio

BUSINESS SESSION OF THE ANNUAL MEETING

MONDAY, MAY 4, 1942

Hotel Chalfonte, Roberts Room

DR. JABEZ H. ELLIOTT, Presiding

Dr. Elliott called the Meeting to order at 2.10 p. m. Seventy-five members were present.

1. DECEASED MEMBERS

The Meeting arose to honor the memory of its 8 deceased members; Dr. Edmund Andrews, Mrs. Myrtle A. Crummer, Dr. J. Rosslyn Earp, Dr. Julius Friedenwald, Dr. Walter W. Hamburger, Dr. A. Graeme Mitchell, Sir D'Arcy Power, Dr. Soma Weiss.

2. REPORTS

The Secretary gave a summary report of the Meeting of the Council held on the preceding day, May 3.

The Treasurer's report was accepted unanimously on recommendation of the Auditing Committee.

3. ELECTIONS

Upon nomination by the Council, Professor Carlos Martínez Durán of the Universidad de San Carlos in Guatemala was elected an honorary member.

4. REVISION OF CONSTITUTION AND BY-LAWS

Upon recommendation of the Council, the Annual Meeting voted to amend the Constitution by adding to Article 5. Honorary Members. Second paragraph, the sentence:

> Names of proposed candidates for Honorary Membership must be submitted in writing to the Council at least a month before the Annual Meeting.

5. PRESENTATION OF THE WILLIAM OSLER MEDAL TO MR. JOHN T. BARRETT, BOSTON UNIVERSITY, SCHOOL OF MEDICINE

DR. ELLIOTT: Mr. Barrett, when a few years ago it was decided to establish a medal called the William Osler Medal we did not know when it would be possible to make this award for the first time. Thanks to the efforts of our Secretary we found the money that enabled us to have the Medal made. The contest is open to all medical students of the medical schools of the United States and Canada. Being on the Medal Committee, I had the opportunity to read the essays that had been submitted. I read them with great pleasure and I am sure that William Osler, had he been alive, would have enjoyed

The William Osler Medal

your essay, "The Inoculation Controversy in Puritan New England." It is an excellent essay which reveals a great amount of original research. It is based not only on the study of books but also of documents. It gives me great pleasure, Mr. Barrett, to present to you the first William Osler Medal that this Association is awarding to a student.

MR. BARRETT: I feel deeply grateful being the recipient of this first William Osler Medal. Ever since I read Cushing's *Biography of Osler* he has been an ideal of mine. It gave me a great deal of pleasure to write this essay, but I must confess that delving deeply into the Library on hot summer afternoons was sometimes not too inviting. This work, however, opened up new horizons to me and I began to realize what the history of medicine might be. I feel at this moment that I would like to continue these studies and I hope that conditions in the future may make it possible for me to do so. Thank you very much, Dr. Elliott.

The Meeting was adjourned at 3.15 p. m.

THE JOHNS HOPKINS INSTITUTE OF THE HISTORY OF MEDICINE DURING THE ACADEMIC YEAR 1941-1942

A REPORT PRESENTED BY

HENRY E. SIGERIST

Director of the Institute

Since last year's report was very detailed, I can limit myself this year to a short factual report on the year's activities.

I. STAFF

HENRY E. SIGERIST, William H. Welch Professor of the History of Medicine and Director of the Institute of the History of Medicine.

OWSEI TEMKIN, Associate Professor of the History of Medicine.

LUDWIG EDELSTEIN, Associate Professor of the History of Medicine.

ISRAEL E. DRABKIN, Carnegie Fellow in the History of Graeco-Roman Science.

G. RAYNOR THOMPSON, Carnegie Fellow in the History of Graeco-Roman Science.

ERWIN H. ACKERKNECHT, Fellow in the History of Medicine.

SANFORD V. LARKEY, Lecturer in the History of Medicine.

EDWARD E. HUME, Lecturer in the History of Medicine.

The staff was increased by three Fellows, the two Carnegie Fellows in the History of Graeco-Roman Science announced in last year's report and Dr. ERWIN H. ACKERKNECHT who joined the staff on January 1, 1942. Dr. Ackerknecht was my student at the University of Leipzig where he graduated in 1931 with a brilliant dissertation *Beiträge zur Geschichte der Medizinalreform von 1848*. Afterwards he studied social anthropology at the University of Paris with Professors P. Rivet and Marcel Mauss. A young scholar trained in history, medicine and social anthropology was a particularly welcome addition to our staff.

Miss ELISE MOALE, secretary to the members of the staff, left the

Institute on March 31, 1942. Her place was taken by Miss JANET BROCK.

II. GRADUATE STUDENTS

Two graduate students worked at the Institute during the year: Dr. ARTURO B. ROTOR, Instructor in the Postgraduate School and Consultant for Domiciliary Medicine in the College of Medicine, University of the Philippines, and Dr. KAMALA GHOSH of Calcutta, India. A student of the School of Hygiene and Public Health, Dr. Ghosh attended all the historical and sociological courses of the Institute.

III. RESEARCH

I am sorry to report that the book on which I was working last year and which was to be called *An Introduction to the Economics of Medicine* has not been completed and will not be finished in the near future. The present plan is to incorporate the material of this book in a treatise on the *Sociology of Medicine* that I intend to write at some future date. I had hoped to be able to write most of the economics book during a two months' sojourn in the country last summer, but I had underestimated the difficulties and was not quite aware that such a book can be written only in a large medical library. The trouble is that large medical libraries are always in cities where it is very difficult to work without being disturbed every minute.

During the past year my chief task was the writing of a book *Civilization and Disease* which is based on a course of lectures that I delivered at Cornell University in Ithaca, N. Y. in 1940. The book is completed and will be published by the Cornell University Press.

My studies in the history of early mediaeval and Renaissance medicine were continued, and various papers were published which are listed in the following section. In the history of public health I translated Pettenkofer's two lectures of 1873 *On the Value of Health to a City* and published them with a comprehensive introduction. I began a series of studies on the history of the American spas. A first paper stating the problem was published in the *Bulletin*, and it will be followed by a series of articles on pioneers of American balneology, the purpose of which is to demonstrate that balneology has not only a European but also an American tradition.

Dr. TEMKIN has completed the translation of the *Gynecology of Soranus* upon which he had been working in cooperation with Drs. Eastman, Edelstein and Guttmacher. The translation is now being revised.

Dr. ACKERKNECHT is working on a book on primitive medicine, ideas from which he is developing in articles in the *Bulletin*. He has written a series of articles on the history of naval surgery which will be published in *Ciba Symposia* in October.

Dr. THOMPSON is continuing his studies on Theophrastus. Dr. DRABKIN has completed the manuscript of a *Source Book in Greek Science* which he has been editing in collaboration with Morris R. Cohen. It is now in the hands of the publisher, McGraw Hill & Co. A paper on "Posidonius and the Circumference of the Earth" will be published in *Isis*.

IV. PUBLICATIONS

A. *Publications of the Institute*

1. *Bulletin of the History of Medicine*

The publication of Volume X was completed during the year. It contained 729 pages, with 22 main articles, 3 texts and documents, 5 notes and comments, monthly reports on medico-historical news and activities, and 95 illustrations. Volume XI was published from January to May 1942, containing 602 pages, with 19 main articles, 10 texts and documents, 10 notes and comments, monthly reports on news and activities, and 49 illustrations. Volume XII is in course of publication.

The plan to publish *Supplements* to the *Bulletin*, explained in the Preface to Volume X, had to be dropped. The number of potential subscribers was too small to warrant initiating a new series. This, however, leaves the problem of publishing medium-size studies still unsolved.

2. *Books.*

First Series: Monographs. Volume I. Edgar Erskine Hume, *Ornithologists of the United States Army Medical Corps: Thirty-six Biographies.* With Foreword by Alexander Wetmore. Baltimore: The Johns Hopkins Press, 1942. xxv + 583 pp., engraved frontispiece, 109 illustrations, cloth.

Second Series: Texts and Documents. Volume I. *Four Treatises of*

Theophrastus von Hohenheim Called Paracelsus. Translated from the original German, with Introductory Essays by C. Lilian Temkin, George Rosen, Gregory Zilboorg, Henry E. Sigerist. Edited, with a Preface by Henry E. Sigerist. Baltimore: The Johns Hopkins Press, 1941, xiv + 256 pp., frontispiece, octavo, cloth.

B. *Publications by Members and Students of the Institute.*

ERWIN H. ACKERKNECHT

In Memory of William H. R. Rivers. *Bulletin of the History of Medicine*, 1942, Vol. XI, pp. 477-480.

Problems of Primitive Medicine. *Ibid.*, 1942, Vol. XI, pp. 503-521.

I. E. DRABKIN

Review of *Hippocratic Medicine: Its Spirit and Method*, by William Arthur Heidel. *Bulletin of the Johns Hopkins Hospital*, 1942, Vol. 70, p. 396.

MIRIAM DRABKIN

A Select Bibliography of Greek and Roman Medicine. *Bulletin of the History of Medicine*, 1942, Vol. XI, pp. 399-408.

Select Pages from Mediaeval Medical Manuscripts. *Ibid.*, 1942, Vol. XI, pp. 409-436.

LUDWIG EDELSTEIN

Horace *Odes* II, 7, 9-10. *American Journal of Philology*, 1941, Vol. 62, pp. 441-451.

Primum Graius Homo (Lucretius 1.66). *Transactions of the American Philological Association*, 1940, Vol. 71, pp. 78-90.

Review of *Hippocratic Medicine: Its Spirit and Method*, by William Arthur Heidel. *Classical Weekly*, 1942, Vol. 35, pp. 147-148.

SANFORD V. LARKEY

William Turner, *A Book of Wines.* Together with a Modern English Version of the Text by the Editors, and a General Introduction by Sanford V. Larkey, and an Oenological Note by Philip M. Wagner. New York: Scholars' Facsimiles & Reprints, 1941.

An Herbal [*1525*]. Edited and transcribed into modern English with an introduction by Sanford V. Larkey and Thomas Pyles. New York: Scholars' Facsimiles & Reprints, 1941.

Science [in the Renaissance]. Francis R. Johnson and Sanford V. Larkey. *Modern Language Quarterly*, 1941, Vol. 2, pp. 363-401.

Organization for Medical Defense. *Bulletin of the Medical Library Association*, 1941, Vol. 30, pp. 56-62.

GENEVIEVE MILLER

Bibliography of the History of Medicine in the United States and Canada—1941. Edited by . . . *Bulletin of the History of Medicine*, 1942, Vol. XI, pp. 437-473.

An Herbal as a Wedding Present: The Juliana Anicia Codex. *Phi Delta Gamma Journal*, 1942, pp. 98-101.

OTTO NEUSTÄTTER

Paracelsus after Four Hundred Years. *Journal of the American Medical Association*, 1941, Vol. 117, pp. 1018-1019.

Mice in Plague Pictures. *The Journal of The Walters Art Gallery*, Baltimore, Md., 1941, Vol. IV, pp. 105-113.

Where did the Identification of the Philistine Plague (I Samuel, 5 and 6) as Bubonic Plague Originate? *Bulletin of the History of Medicine*, 1942, Vol. XI, pp. 36-47.

HENRY E. SIGERIST

Max von Pettenkofer, *The Value of Health to a City*, Two Lectures Delivered in 1873. Translated from the German, with an Introduction by Henry E. Sigerist. Baltimore: The Johns Hopkins Press, 1941, 52 pp., 1 portrait. [Reprinted from *Bulletin of the History of Medicine*, 1941, Vol. X, pp. 473-503, 593-613.]

Paracelsus, *A Book on Nymphs, Sylphs, Pygmies, and Salamanders, and on the Other Spirits*. Translated from the German, with an Introduction by Henry E. Sigerist. In: *Four Treatises of Theophrastus von Hohenheim Called Paracelsus*. Baltimore: The Johns Hopkins Press, 1941, pp. 213-256.

The Realities of Socialized Medicine. In: *Patterns and Perspectives: Essays for College Use*. Edited by W. Earl Britton, Carl E. Burklund, William H. Egly, Ivan H. Walton. New York: F. S. Crofts & Co., 1942, pp. 283-299.

Developments and Trends in Gynecology. *American Journal of Obstetrics and Gynecology*, 1941, Vol. 42, pp. 714-722.

Paracelsus in the Light of Four Hundred Years. In: *The March of Medicine*, edited by the Committee on Lectures to the Laity of the New York Academy of Medicine. New York: Columbia University Press, 1941, pp. 28-51.

A Hundred Years in Medicine. In: *Queen's University, A Centenary Volume, 1841-1941*. Toronto: The Ryerson Press, 1941, pp. 69-90.

Soviet Medicine in Wartime. *Soviet Russia Today*, June, 1942, Vol. 11, pp. 12-13, 30.

La Historia de la Medicina en la República Argentina. *Revista Argentina de Historia de la Medicina;* 1942, Año I, N.° 1, pp. 37-53.

La Historia de la Medicina en América Central y América del Sud.

Publicaciones de la Cátedra de Historia de la Medicina, Buenos Aires, 1942, Vol. V, pp. 165-191.

The Social History of Medicine. *Camsi*, Journal of Canadian Association of Medical Students and Internes, 1942, Vol. I, No. 1, pp. 37-41.

The Johns Hopkins Institute of the History of Medicine During the Academic Year 1940-1941; A Report. *Bulletin of the History of Medicine*, 1941, Vol. X, pp. 364-416.

The Word "Bombastic." *Ibid.*, 1941, Vol. X, pp. 688-689.

War and Culture. *Ibid.*, 1942, Vol. XI, pp. 1-11.

American Spas in Historical Perspective. *Ibid.*, 1942, Vol. XI, pp. 133-147.

The *Sphere of Life and Death* in Early Mediaeval Manuscripts. *Ibid.*, 1942, Vol. XI, pp. 292-303.

An Autograph Letter of Alexander Ricord. *Ibid.*, 1942, Vol. XI, pp. 475-477.

The Term "Plasmodium Falciparum"; A Note in Defense of Dr. Welch. *Ibid.*, 1942, Vol. XI, pp. 587-588.

C. LILIAN TEMKIN

Paracelsus, *Seven Defensiones, the Reply to Certain Calumniations of His Enemies*. Translated from the German, with an Introduction by C. Lilian Temkin. In: *Four Treatises of Theophrastus von Hohenheim Called Paracelsus*. Baltimore: The Johns Hopkins Press, 1941, pp. 1-41.

OWSEI TEMKIN

A Mediaeval Translation of Rhazes' Clinical Observations. *Bulletin of the History of Medicine*, 1942, Vol. XII, pp. 102-117.

V. COURSES

During the academic year the following courses were given:

INTRODUCTORY AND GENERAL COURSES

1. Use of the Library. Dr. LARKEY. First quarter.
2. Greek and Latin Terminology in Modern Medicine. Dr. EDELSTEIN. First quarter, four lectures.
3. Outlines of the History of Medicine. Dr. TEMKIN. First quarter, two hours weekly.
4. Ancient Medicine from Homer to the End of Antiquity. Dr. EDELSTEIN. One hour weekly through the academic year.
5. History of Pathology in the 19th Century. Dr. TEMKIN. Third quarter, one hour weekly.

ADVANCED COURSES

Seminar in the History of Medicine

6. Problems of Graeco-Roman Medicine and Science. Dr. SIGERIST and staff. Third and fourth quarters, one hour weekly.
7. The Aphorisms of Hippocrates. Dr. SIGERIST. Second and third quarters, one hour weekly.
8. The Ancient Peripatos and the Development of Ancient Science. Dr. EDELSTEIN. Third and fourth quarters, one hour weekly.
9. Dietetics in China. Dr. HUME. Three seminars during the fourth quarter.

Seminar in the Sociology of Medicine

10. Medicine in a Changing World. Dr. SIGERIST. Second, third and fourth quarters, two hours weekly.

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11. Journal Club. Dr. SIGERIST. Two hours every two weeks, throughout the year.

VI. GRADUATE WEEK

The *Third Graduate Week in Medical History* was held at the Institute from April 27 to May 2, 1942 on the subject of *Contributions of Greece and Rome to Medicine*. It was attended by the following 16 members:

Dr. George L. Banay	Worcester State Hospital, Worcester, Mass.
Miss Grace Bartle	St. Vincent's Hospital, Indianapolis, Ind.
Dr. S. B. Chandler	West Virginia University, Medical School, Morgantown, West Va.
Dr. Pan S. Codellas	240 Stockton St., San Francisco, Calif.
Dr. Iago Galdston	The New York Academy of Medicine, 2 E. 103rd St., New York, N. Y.
Dr. Kamala Ghosh	c/o Chief Medical Officer, W. M. S., Red Cross Building, New Delhi, India
Dr. Joseph Gillman	University of the Witwatersrand, Medical School, Johannesburg, South Africa
Mrs. Edwin H. Koehler	2 West 43rd St., New York, N. Y.
(Mrs.) Margarita Pennington Luttichau	The Greenway, Charles & 34th Sts., Baltimore, Maryland.
Dr. George Rosen	2801 Avenue R, Brooklyn, N. Y.
Mr. Henry Schuman	20 East 70th St., New York, N. Y.
Dr. Benjamin Spector	Tufts College, Medical School, Boston, Mass.
Dr. Dorothy Stimson	Goucher College, Baltimore, Md.

Members of the Seminar in the Sociology of Medicine.

(Mrs.) Nell Snow Talbot	University of Illinois, College of Dentistry, 808 South Wood Street, Chicago, Ill.
Dr. Anne Tjomsland	821 Bergen Avenue, Jersey City, N. J.
Dr. Alfred H. Whittaker	1427 East Jefferson Avenue, Detroit, Mich.

Program

From 9 a. m. Monday, April 27	Registration
10 a. m.	Opening Address: "The Johns Hopkins Institute of the History of Medicine, its History, Function and Facilities" *Dr. Henry E. Sigerist*
10:30 a. m.	Lecture: "A Hippocratic Physician Treats a Pneumonia Patient" *Dr. Henry E. Sigerist*
2 p. m.	Seminar: "Bibliography of Greek and Roman Medical Literature" *Dr. Henry E. Sigerist*
4:00 p. m.	Demonstration of Exhibit on Greek and Roman Medicine
8:30 p. m.	Meeting of the JOHNS HOPKINS MEDICAL HISTORY CLUB "The Excavation of Olynthus" *Dr. David M. Robinson*, Professor of Archaeology and Epigraphy and Lecturer on Greek Literature at The Johns Hopkins University A reception was held in the Great Hall of the William H. Welch Library after the meeting
Tuesday, April 28	
10:00 a. m.	Lecture: "A Hippocratic Surgeon's Practice" *Dr. Owsei Temkin*
2:00 p. m.	Seminar: "The Cult of Asclepius" *Dr. Ludwig Edelstein*
4:00 p. m.	Demonstration of Exhibit Tea in the Great Hall

MEMBERS OF THE SEMINAR IN THE SOCIOLOGY OF MEDICINE.

THIRD GRADUATE WEEK IN MEDICAL HISTORY.
In the Seminar Room of the Institute.

Wednesday, April 29

10:00 a. m. — Lecture:
"A Medical Student in Alexandria"
Dr. I. E. Drabkin, Carnegie Fellow in the History of Graeco-Roman Science

3:00 p. m. — Visit to the Archaeological Museum of The Johns Hopkins University. Demonstrations by *Professor David M. Robinson*

4:00 p. m. — Reception at the Tudor and Stuart Club of The Johns Hopkins University, at Homewood

8:30 p. m. — Meeting of the CORDELL HISTORICAL SOCIETY of the University of Maryland
"History of the Medical Examiner's System"
Dr. Howard W. Maldeis, Chief Medical Examiner of the State of Maryland
"William Hunter and his Magnum Opus"
Dr. John E. Savage, Associate in Obstetrics, University of Maryland, School of Medicine

Thursday, April 30

10:00 a. m. — Lecture:
"Anatomical Demonstrations in Antiquity"
Dr. Owsei Temkin and *Dr. William Strauss*

2:00 p. m. — Seminar:
"Drug Lore and Drug Trade in Greece and Rome'
Dr. G. Raynor Thompson, Carnegie Fellow in the History of Graeco-Roman Science

4:00 p. m. — Tea in the Great Hall

Friday, May 1

10:00 a. m. — Lecture:
"Soranus Makes a Delivery"
Dr. Alan F. Guttmacher, Associate Professor of Obstetrics, The Johns Hopkins University School of Medicine

2:00 p. m. — Seminar:
"Greek and Latin in Medical Terminology"
Dr. Ludwig Edelstein

7:30 p. m. — Dinner at the Hamilton St. Club

In the Seminar Room of the Institute.

THIRD GRADUATE WEEK IN MEDICAL HISTORY.

Anatomical Demonstration in Antiquity: Dr. William Strauss dissects a monkey.

Saturday, May 2

10 a. m.	Lecture: "Hygiene in Every-Day Roman Life" *Dr. Henry T. Rowell*, Professor of Latin, at The Johns Hopkins University
12 noon	End of the course

VII. LECTURES

The following lectures were given by members of the Institute during the academic year outside of the regular courses and the Graduate Week:

HENRY E. SIGERIST

1. October 14, 1941	*The History and Sociology of Medicine.* McGill University, School of Medicine, Montreal, Canada
2. October 14	*Youth Has a World to Build.* Montreal Group of *New Advance*, Montreal, Canada.
3. October 15	Seminar discusion on *Health Insurance.* Ottawa, Canada
4. October 16	*Socialized Medicine in the Soviet Union.* Social Problems Forum of Queen's University, Kingston, Ontario
5. October 17	*A Hundred Years in Medicine.* Centenary of Queen's University, Kingston, Ont.
6. October 25	*The Historical Approach to Medicine.* University of Kansas, School of Medicine, Kansas City, Kansas
7. October 30	*The Protection of Health in the USSR.* American Council on Soviet Affairs, Baltimore, Md.
8. November 3	*American Spas in Historical Perspective.* The Johns Hopkins Medical History Club, Baltimore, Md.
9. November 5	*The History of Some Great Medical Books.* Enoch Pratt Free Library, Baltimore, Md.
10. November 13	*The Welch Medical Library and the Institute of the History of Medicine.* Enoch Pratt Free Library, Baltimore, Md.
11. December 2	*Medical Practice in Historical Perspective.* Medical Society of Greater Boston, Mass.

THIRD GRADUATE WEEK IN MEDICAL HISTORY.

Dr. G. Raynor Thompson demonstrating his exhibit of Botany and Drugs in Antiquity

12.	December 8	*The Various Approaches to the History of Science.* Goucher College, Baltimore, Md.
13.	December 10	*Problems of Social Medicine.* Johns Hopkins University, College for Teachers, Baltimore, Md.
14.	December 12	*The Social Implications of Science.* Science Club, The Johns Hopkins University, Baltimore, Md.
15.	December 29	*The Preservation of Culture in Wartime.* Annual Convention of the Association of Medical Students and Internes, Chicago, Ill.
16.	December 31	*Changes in the Social Distribution of Disease.* Annual Meeting of the History of Science Society, Chicago, Ill.
17.	January 10, 1942	*International Cooperation in the Development of Medicine.* Cosmopolitan Club, The Johns Hopkins University, Baltimore, Md.
18.	January 19	*The Protection of Health in the USSR.* Social Problems Forum, Goucher College, Baltimore, Md.
19.	January 21	*Women in Medicine.* Baltimore Lecture Group, Baltimore, Md.
20.	February 28	*The Sociology of Medicine.* Johns Hopkins Alumni Association of Georgia, Atlanta, Ga.
21.	March 5	*Socialized Medicine.* Kenyon College, Gambier, Ohio.
22.	March 5	*Leonardo da Vinci.* Kenyon College, Gambier, Ohio.
23.	March 6	*Social Implications of Science.* Kenyon College, Gambier, Ohio.
24.	March 19	*Medicine and Society.* Connecticut College for Women, New London, Conn.
25.	April 8	*Impotence as a Result of Witchcraft in the Middle Ages.* The Johns Hopkins Medical History Club, Baltimore, Md.
26.	April 11	*The Significance of History in a Period of Emergency.* Annual Meeting of the Mt. Sinai Alumni, New York, N. Y.

THIRD GRADUATE WEEK IN MEDICAL HISTORY.
Dr. C. Rayner Thompson demonstrating his exhibit of Botanic and Drugs in Antiquity

THIRD GRADUATE WEEK IN MEDICAL HISTORY.
Dr. I. F. Drabkin and Dr. Ludwig Edelstein demonstrating their sections in the exhibit

27. April 22 — *What War Has Done to Medicine and Medicine to War.*
Washington Academy of Science, Washington, D. C.

OWSEI TEMKIN

November 3, 1941 — *Tradition and Progress in the History of Epilepsy.*
The Johns Hopkins Medical History Club, Baltimore, Md.

LUDWIG EDELSTEIN

November 3, 1941 — *Origin and Development of the Asclepius-Religion.*
The Johns Hopkins Medical History Club, Baltimore, Md.

SANFORD V. LARKEY

November 3, 1941 — *Program for the Medical History of the Emergency.*
The Johns Hopkins Medical History Club, Baltimore, Md.

VIII. CONVENTIONS

During the past year members of the Institute attended the following conventions:

Centenary of Queen's University, Kingston, Ontario, October 16-18, 1941 [Dr. SIGERIST].

Fall Meeting of the American Association of the History of Medicine, Kansas City, Kansas, October 24-25, 1941 [Dr. SIGERIST].

Annual Convention of the Association of Medical Students and Internes, Chicago, Ill., December 27-29, 1941 [Dr. SIGERIST].

Annual Meeting of the History of Science Society, Chicago, Ill., December 30-31, 1941 [Dr. SIGERIST].

Annual Meeting of the American Council of Learned Societies, Philadelphia, Pa., January 30-31, 1942 [Dr. SIGERIST].

Eighteenth Annual Meeting of the American Association of the History of Medicine, Atlantic City, N. J., May 3-5, 1942 [Dr. SIGERIST, Dr. TEMKIN, Dr. EDELSTEIN, Dr. LARKEY].

THIRD GRADUATE WEEK IN MEDICAL HISTORY.
Dr. I. E. Drabkin and Dr. Ludwig Edelstein demonstrating their sections in the exhibit

IX. COLLECTIONS OF THE INSTITUTE

During the past year the collections were increased by:

1. Books	237	items
2. Autographs	11	"
3. Documents	10	"
4. Portraits	68	"
5. Objects	6	"
6. Pictures	78	"
7. Slides	13	"

X. EXHIBITS

A. *In the Exhibition Hall of the Institute*:

1. Medical Autographs in the Henry Barton Jacobs Collection (November to February).
2. The History of American Hospitals and Medicine in Early Philadelphia (February).
3. In February and March the Department of Preventive Medicine displayed an exhibit of Health Posters from Foreign Lands.
4. Some Publications by Officers of the United States Army Medical Corps (April).
5. Contributions of Greece and Rome to Medicine (April 27-July 31).

B. *In the Lobby of the Welch Library*:

Short exhibits of two weeks' duration were prepared illustrating Highlights in the History of Anatomy, Histology, Embryology, Physiology, Biochemistry, Pathology, Bacteriology, Pharmacology, Clinical Medicine, Pediatrics, Neurology, Dermatology, Syphilology. The series will be continued.

XI. GIFTS

The most important gift that the Institute received during the past year was a collection of books on the History of Gastroenterology from the estate of Dr. Julius Friedenwald, presented by Mrs. Julius Friedenwald. The collection fills many important gaps in our library. Other books were received from Prof. Juan Ramón Beltrán, Miss Julia Bilger, Dr. Harry Friedenwald, Dr. Iago Galdston, Dr. Solomon R. Kagan, Prof. Carlos Martínez Durán, Prof. Carlos

Enrique Paz Soldán, Rockefeller Foundation, Dr. George Rosen, Mr. Siegfried Weisberger.

The Institute was also presented with various autographs and other manuscript materials by Mr. Louis Birenbaum, Mrs. George Edward Clark, Miss Elisabeth J. Davison, Dr. Allen W. Freeman, Dr. Harry Friedenwald, Dr. C. N. McBryde, and Dr. Curt Proskauer. Portraits and pictures were donated by Miss Katharine N. Bradford, Dr. T. Wood Clark, Mrs. Julius Friedenwald, and Mrs. Sally McGlannan. Among these the most important item was a photograph album containing pictures of the visiting and house staff of the Johns Hopkins Hospital, 1902-1903 taken by Dr. T. Wood Clark who was Medical House Officer at that time.

Dr. J. Earle Moore presented the Institute with a collection of obstetrical instruments dating from the Napoleonic era from the estate of Dr. Albert Keidel.

All in all, the Institute received the following number of gifts:

1. Books	161	items
2. Autographs	11	"
3. Documents	1	"
4. Portraits	65	"
5. Objects	6	"
6. Pictures	3	"

XII. BUDGET

The budget of the past year amounted to $31,349.94 to which was added an unexpended balance of $2,786.83 from the previous year.

XIII. MISCELLANEOUS

On December 10, 1941 the History of Science class of Dr. Dorothy Stimson paid its annual visit to the Institute. The guests were shown the various collections and were entertained at luncheon in the Great Hall of the Library. On March 11, 1942 a group of Chilean physicians visited the Institute. On October 18, 1941 on the occasion of the centenary of Queen's University, Kingston, Ontario, Dr. Sigerist was awarded the degree of Doctor of Laws, *honoris causa*.